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EDITORIAL NOTES—GAS, &c.

The Broad View—This Year at the Crystal Palace.

IT cannot be denied that the commercial aspects of the gas industry at the present have predominance in consideration, and must do so for some time to come. These aspects are extensive—reaching from the raw material purchased, the quantity and character of the products, right away to the points of their utilization. The broader the view that is taken of them, the more encouraging is the result. Addressing the proprietors of the South Suburban Gas Company last Friday, Mr. Charles Hunt took the broad view, as might be expected from one who has spent a long life, in prominent position, in dealing with the affairs of the gas industry, in their manifold phases, through the period of its most active development, both technical and commercial. It is the broad view that it is necessary for gas managements to take in these times, and, in taking it, the importance will be magnified of every gas administration realizing the responsibility that rests upon them in losing no opportunity of advancing not only their own interests, but the larger interests of the gas industry as a whole. That was the thought that had an under-currency in the main parts of Mr. Hunt's address. Politically we have often heard the expression of "Little Englander;" and we have also heard of those who think "imperially." Applied to the gas industry, the terms are perhaps hardly appropriate, but they are expressive of meaning, when it is said that the present is not the time for any gas management to narrow the view of the interests of the gas industry as a whole down to the immediate and local concerns of the undertaking with which there is association. But the fact remains that there is a remarkable hesitancy and aloofness displayed in the industry in supporting schemes that have for their object common protection, advertising, and propaganda work—the "wider interests," as Mr. Hunt describes them, "of which "every gas undertaking is more or less the custodian." There is also an all too common reluctance to expend money, before actual pressure imperatively compels, to demonstrate the progress of the efficiency of modern gas appliances. This is not good for an undertaking, nor for the industry at large. The influence of success in one place permeates far beyond its immediate bounds. Therefore it is that the thought of the mutuality of interest wants to be encouraged more and more.

The Board and officials of the South Suburban Gas Company are not of the class whose thoughts and actions are bound by an inflexible self-interest. So it comes about that the eyes of the gas industry, British and beyond our littoral confines, will be directed to the magnificent piece of work they have set themselves to do this year, in lighting by high-pressure gas-lamps the Empire of Festival Exhibition at the Crystal Palace, including the extensive grounds, in manner described in a special article elsewhere, and referred to briefly in Mr. Hunt's address. And beyond the high-pressure gas-lighting, the Company will supply the power, by two 1000-horse power and one 750-horse power gas-engines, to demonstrate the comparative cheapness of generating electricity by town gas, for both electric lighting and power. The work is on a scale that represents great financial and other obligations and responsibility. Such a large piece of work, while it will assist in swelling the volume of gas output for a period must, for a time-limited exhibition, involve an amount of first and incidental expenditure that will aggregate to a fairly considerable sum. But there was the opportunity. It was an opportunity not to be lost in the interests not only of the Company but of the gas industry at large. And, in competition with the local Electric Supply Company, the opportunity was won. It will be one of the finest demonstrations of the actual position and potentiality of gas as a lighting and power agent there has ever been within a single place of such extensive and unique entertainment and attraction as will be the Crystal Palace during the Festival of Empire Exhibition this year. All praise to the Board of the South Suburban Company, and to their Engineer (Mr. S. Y. Shoubridge). By them, nothing will be left undone (though the work of installation from entrance gates throughout will be all new) to make the display a success. From the gas point of view, the spectacle and display will overshadow all else in this country in the way of gas demonstration this year; and it, with the gas stand at the Shepherd's Bush Exhibition—representation at the two great centres of attraction in the one year is good—and with the new inverted high and low pressure street lighting in London, will form an excellent set-off to the exhibition of the electrical industry at the end of the summer at Olympia. Gas was the first in the field as a systematized distributed agent for lighting, for heating, and for power; it is first now in economy and efficiency; and the gas industry must think and act (so to speak) "imperially," and thus maintain its primary product in the public mind in the proud position that it now occupies.

Laying the CO_2 Phantom.

IF those people who quote from certain ancient manuscripts and make apocryphal statements with the view of slandering, and decrying the use of, gas will condescend to take count of things as they actually exist at the present time, they will find that contemporary medical opinion is constantly swelling in favour of gas. The mistakes of the past are being rectified by the more advanced knowledge of the present. Not content with the experiences in the lecture and exhibition rooms of the Society of Medical Officers of Health, perhaps the competitors of the gas industry will find something rather more persuasive in certain practical experiments of Dr. F. S. Toogood, at the Lewisham Infirmary, in the dark and damp month of November. Dr. Toogood is an independent investigator and witness; and what he has found tears into shreds the pet theories of those whose first business is to inculcate fear in the minds of the technically uninstructed in the matters of gas lighting and heating, in order to reap therefrom some commercial advantage. The results of the learned Doctor's experiments in two occupied wards and a sitting-room at the infirmary referred to are stated in plain English, and in a manner that "he who runs "may read," in an article in the "Medical Magazine," from which we extract liberally in other columns. What is stated there will prove indigestible reading for those whose cause the results and conclusions will by no means serve; and there are Inspectors of a certain Government Department who perhaps do not all presume to have medical and chemical qualifications who may find some educational benefit from Dr. Toogood's researches.

There is one thing we have failed to induce the calumniators of gas to do, and that is to take into account the widely differing character of carbon dioxide produced by the combustion of gas and that emitted as the result of respiration and perspiration. Dr. Toogood insists that there should be no mistake on this point; and it is perhaps worth while to give emphasis to what he says by quotation, although the matter, in other words, has been frequently presented before. He remarks: "The carbon dioxide produced by "the combustion of purified coal gas is a chemically harm-"less, inactive gas, the presence of which to the extent of "20 to 30 parts in 10,000 would have no physiological effect "on the inhabitants of a room." He proceeds: "This is a "point that needs always to be borne fairly in mind" [*vide* electrical advertising literature] "by those dealing with pro-"blems of hygiene; otherwise systems of lighting and heating "that are not only both economical and convenient, and which "also assist in the ventilation of apartments, may be con-"demned simply because their use entails the discharge into "the atmosphere of small quantities of carbonic acid and water "vapour." The principal tests that Dr. Toogood made were of the type of gas-heating arrangements that have come in

for the strongest of all condemnation. That is the flueless type of gas-radiator. But what did he find? In a ward in which eight of these gas-radiators were employed, consuming together 128 cubic feet of gas an hour, and in which four "Nico" inverted lamps, each fitted with three burners, were in use, consuming in all 42 cubic feet an hour, or a total of 170 cubic feet for heating and lighting, the average carbon dioxide in the atmosphere, after four hours' burning, was only the same as in a comparable ward in which coal fires were in use, and no gas was burning for lighting—viz., 5·7 parts in 10,000. The gas-heated and lighted ward contained rather more patients than the other at the time of the test; and what is also of importance, the ventilating arrangements were of normal character—no electric fans or any other mechanical ventilating arrangement being in use. Similar results were obtained in an occupied sitting-room, in which a large gas-fire—21 inch—was being run on 45 cubic feet of gas an hour, and, for lighting, three "Nico" inverted burners were employed, each consuming 2½ cubic feet per hour—a total consumption in the room of 52·5 cubic feet per hour. An interesting point is that, in the centre of the room, the average of the carbon dioxide was 5·75 parts in 10,000, while only 3 feet in front of the fire the average was 5 parts. The humidity tests are also of interest.

In every respect, the conclusions of the investigator confirm those of predecessors who have set out to ascertain the truth. He states his conclusions in a manner to supply some hard nuts for the commercial enemies of gas lighting and heating to crack. He is convinced as to gas being "a "valuable adjunct" to the ordinary ventilation of a room. Of course, flueless gas-stoves do require the place in which they are used to be properly ventilated. Given the proper ventilation, they are an economical means of heating. There is sapiency in, and an excellent law underlying, the remark: "A ward or other public building in which gas-radiators "cannot be used with advantage is improperly ventilated." Gas managers will find the testimony of Dr. Toogood, obtained from the experiments at the Lewisham Infirmary, of great value in combatting the nonsense (which may have the effect desired in some quarters) that is being freely disseminated in the country by competitors, whose only excuse for their action in maligning gas is the commercial disadvantage under which they pursue their business. But that excuse is not a normal or a legitimate one.

The Electrical Campaign.

In other columns, some light is thrown upon one side of the work of the Electricity Publicity Committee; and it will be seen that the Committee are not at all fastidious as to the quality of the powder and shot employed in the campaign against the gas industry. This fact makes publicity operations on behalf of the gas industry the more pressing, as it is not a mere question of competition on merit and price, but the Electricity Committee are using as ammunition statements drawn from any quarter that, applied to the ordinary circumstances of gas use, constitute nothing short of trading slander of the topmost order. The gas industry cannot, and must not, allow this sort of thing to go on indefinitely. It must be met, or some people will begin to wonder whether or not the gas industry have anything to say in self-defence.

The new batch of literature, prepared by the Electricity Publicity Committee, for purchase and circularization by electricity undertakings, contains a plethora of hyperbole and inexactitude; and, as will be observed, the Committee are now particularly playing, and that loudly, upon the poisonous fumes and danger notes. The present line of business-getting policy is to try to frighten consumers into turning from gas to electricity; and, in doing this, as we say, the Committee are not at all over-conscientious as to what is said, or whether it is pertinent. But it is noticeable that the Committee exercise a fair amount of discretion by borrowing assertions of other people, and not failing to give them the credit (or otherwise) of authorship. They have very little to say to which they would personally care to append their names. This is highly discriminating on their part, but not courageous.

How long is the gas industry, as a whole, going to permit this sort of thing to proceed without making an effective reply through a similarly authorized and financed organization? The sooner the industry makes up its mind that the Gas Publicity Committee must commence operations, and on an effective scale, the better. The reply to the circulars before us—and there is plenty of fact and material available for reply, and for destroying the electrical case—should not be delayed. There is much work to be done, and work that cannot be entered upon thoroughly and efficiently while gas undertakings continue to dangle about with the question as to whether or not support shall be given to the new movement. If the Electricity Publicity Committee's work will not bring about a prompt decision, then we do not know what will. Should the circulars have a persuasive force in this connection, then the Committee may take credit for having produced something that has served at least one useful purpose.

Grants for Tar-Surfacing Roads.

When the Chancellor of the Exchequer produced his famous Budget of 1909, which set the whole world agape, raised the ire of his political opponents, and the enthusiasm of his own party, the gas industry ventured to look into the suggested revolution in the nation's fiscal affairs in order to see whether there was to be for it any little picking in the way of advantage. There was what appeared to be a modest one; but there were no possible means of exactly gauging its value. It will be remembered that Mr. Lloyd George included in his revenue schemes taxes on motor vehicles and petrol; and, in distributing the benefits, he, with a practical eye upon the destruction and nuisance caused by fast-travelling cars, proposed that, from the income so raised, a goodly sum per annum should be set aside as a subsidy for road maintenance. As tar has a very prominent part in the modern methods of road maintenance under the conditions of a hard triturating wear, the gas industry felt justification in looking for some amount of advantage turning their way, through the encouragement that the proposal to render financial aid would give to county councils and other road authorities to put and keep their roads in better condition for motor traffic and for the comfort of communities generally.

The hope is being fulfilled. The Road Board that has emerged from the original idea has, with the approval of the Treasury, now made a number of advances from the road improvement fund to county councils and other highway authorities; but up to the present the details of what has been done are not complete. The Board have had a considerable number of schemes before them, embracing the tar-spraying of extensive lengths of roadway, the construction or reconstruction of lengths in tar macadam, and a number of improvements of roadways and dangerous corners, which last-named may or may not involve the absorption of tar. Anyway, though it is impossible to gauge what will be the value to the gas industry of the work of road improvement and maintenance that is being encouraged through the grants of the Road Board, there are figures now available which show that, taking the country through, the money spent in this direction should aggregate to a fairly heavy sum. Extracting from the costs of, and grants for, schemes already published in which there is direct allusion to tar work, there are particularly notable proposals in Kent and Lancashire. In Kent, there are three in which the use of tar will take a substantial part. One is a project for surfacing with tar macadam a considerable road area, the estimate for which is £33,692, and towards this the Road Board have made a grant of £4043. Another scheme contemplates the surfacing of a length of roadway with pitch-grouted macadam. This, it is computed, will cost about £8750; and the Road Board make a grant of £875. The third scheme is for some extensive surface tarring, which is calculated to cost £13,541; and the grant is £8733. The total expenditure for these three schemes is £55,983; and the Board's subventions amount to £13,651. It will be noted that there does not appear to be any relation between the estimated cost of the schemes and the grants; but this is probably accounted for by the fact that the Road Board take into consideration what is called the improvement value of the scheme, and this value has obviously a variable relation to the estimated total cost. The gas industry ought to be grateful to the Kent County Council, and to that erstwhile Gas Engineer, Mr. H. P. Maybury, M.Inst.C.E., who is now the County Surveyor, for what has been done there by extensive example in developing the use of tar for road purposes. They do the thing thoroughly and well. For instance in 1909, out of some 750 miles of road the Council treated 303 miles with tar. And what is more, they know, and their knowledge is founded on the rock of experience, that there is a saving value in the use of tar in

road making and maintenance. In 1902, the main roads of the county cost in maintenance £162 per mile; in 1909, including tar painting and improvements, they cost £137 per mile. This shows that tar is taking an unassailable place in the economics of road construction and maintenance.

Lancashire is also to the fore with some large schemes, in connection with which grants have been made by the Road Board. One of the proposals is for the tar spraying of the principal roads in the county, at a cost of £10,622; and a grant of £5000 has been allowed towards defraying the outlay. A second scheme proposes to tar macadam a considerable length of road at an expense of £24,484; and the contribution by the Board towards this is £9772. A third scheme, to cost £12,808, is for certain road widening and surfacing in tar macadam; and the Board have voted £5712 to it. These three projects alone contemplate an expenditure of £47,914; and the grants amount to £20,484. In Buckinghamshire a scheme proposing the surfacing of certain sections of road with tar macadam is going to cost £7393; and towards this a grant of £3268 has been made. For another small proposal for surface tarring, £50 has been allowed by the Board. To the county of Carnarvon a grant of £238 has also been made for the same purpose. These two latter proposals appear, by the comparatively small expenditure on them, to be merely tentative. But the few schemes mentioned here represent a total estimated outlay of £111,290, £37,691 of which will be discharged by the Road Board's subsidies.

This is as far as the information before us goes as to the schemes of road improvement in which it is definitely stated that tar will be required for the work. It will also be noted that the figures only refer to four of the total number of counties, though schemes of road improvement relating to four other counties have also been published. But in regard to these latter, there cannot be traced any connection between the plans and the utilization of tar. However, the particulars are illustrative of a growing and very gratifying belief in the employment of tar both in road construction and road maintenance; and, what is more, the belief is being supported in a very material way.

Coke-Oven Gas Developments.

THE schemes, actually in operation, and prospectively within range of materialization, of coke-oven gas utilization for domestic purposes in this country, sink into insignificance when compared with what is being done in Germany, as was mentioned in the first number of the "JOURNAL" issued this year, and with what is being accomplished in America as is told to-day by Mr. Edwin A. Moore in his interesting letter elsewhere. This is a utilitarian age; and nothing can stop the march of the economies great and small that this word covers, providing that they are real economies. It may not always be so in connection with the distribution of coke-oven gas; and local and industrial conditions must be weighty governing factors in determining whether the utilization of coke-oven gas for general purposes will be advantageous or otherwise to communities. To America we are debtors for much very useful information concerning the vogue of coke-oven gas, both through direct and indirect channels. Among the direct channels is the classical production that Dr. Schniewind presented at the Engineering Congress at Glasgow almost a decade ago; and the paper by Dr. Paul Schlicht read at the Dublin meeting of the Institution of Gas Engineers in 1907. In this latter will be found much information regarding the coke-oven system in which our correspondent of to-day is particularly interested. But it must not be forgotten, in reading of the successes in America, that the conditions there are altogether more favourable than in this country for the large schemes of coke-oven gas distribution.

There was, nevertheless, a time when fingers were burnt in America over the application of coke-oven gas to town supply. But that is quite a long time ago now; and though at one period happenings were held up in our pages as warnings, it is just as easy now to hold up successes as worthy of emulation under conditions that have the fitness of those that have served to demonstrate the successes in America. Under the circumstances at home, however, there will be contentment in going slowly. At the same time we must applaud the perseverance and the faith that have existed in America among those associated with this business of coke-oven gas utilization. When we read of great cities now being supplied regularly from coke-oven plants with gas of 17-candle power, and with a [gross ?] heating value of some 675 B.Th.U., and of the gas being conveyed nearly ninety miles for supply, it is time that we began to hesitate in making predictions, even under our home circumstances, as to the future. America has shown us much in the past; and we are indebted for the illustrations of remarkable progress outlined in the communication of our correspondent. When we look back at the progress made in America in this direction since Dr. Schniewind presented his paper ten years ago, it serves to restrain attempts at picturing what it will be in another ten years. But the experience of the past gives the best of grounds to those engaged in this industry to anticipate that the progress is not yet awhile going to make any abrupt termination.

Corporations and Income-Tax.

An unsuccessful appeal to the King's Bench Division has been made by the Leeds Corporation against the assessing to income-tax by the Income-Tax Commissioners of a sum of £78,000, on which the Corporation contended that the tax had already been paid by their various municipal undertakings. It is, however, pointed out that the local rates will not be affected by the judgment, as the sums in dispute have been paid from time to time, under protest; and provision had been made in the estimates in case the decision of the Court should go against the Corporation. In the matter of costs, too, as the appeal was a test case, the other corporations who joined in it with Leeds will bear a proportion of the expense. The question to be decided was admittedly of a complicated character, and raised difficult points; and it was in the form of a special case, stated by the Income-Tax Commissioners for the opinion of the Court. By the Corporation Act of 1901, the loans obtained previously were gathered into one department, and the interest and capital charges of all loans was put into one pocket and charged *pari passu* to the revenue of the Corporation. To pay the whole of the interest on the loans, the Corporation required in the year in question (the twelve months ending April 5, 1903) a sum of £285,000. This was paid, and the income-tax thereon was deducted from the amounts due to the stockholders. From the water-works, gas-works, tramways, electricity works, city fund, and consolidated fund, the Corporation received £270,000, derived from taxable property of different kinds; and upon the whole of this amount tax had been paid by the Corporation.

A Judgment of the High Court.

If, therefore, said Mr. Justice Hamilton in the course of a lengthy judgment on the case, the Corporation were to seek to pay the whole of their interest out of the whole of their taxable income, they would be £15,000 short, and to that extent would be obliged, instead of resorting to property which brought in profits, to levy a rate. Under the Act of 1901, a dividends fund account was kept, into which certain sums had to be paid out of the separate accounts kept by the Corporation. In point of fact, the Corporation had not paid interest on the parts of the loans attributable to the electricity undertaking, and to matters falling upon the consolidated rate, by the application of surpluses arising on the water-works, the gas-works, tramways, and general undertakings falling on the city fund. They had not done so in the sense that the actual cheques received in respect of these undertakings were utilized for the purpose of paying such interest. But there would be no difficulty at all in stating an account which would show that there were available for the service of the loans, which, prior to 1901, were specific matters affecting the consolidated rate, various surpluses arising out of matters which before that date belonged to the borough rate. It was in this connection that the present dispute arose. There being an aggregate excess of £78,000 in respect of water-works, gas-works, tramways, and city fund, it was contended by the Corporation that to this extent they were entitled to retain these deductions by way of income-tax which they had made as against their stockholders, because they were entitled to claim that, in the contemplation of the law, they had paid, or might have paid, interest, on the other part of the undertakings, by the application of what he might call the borough rate undertaking excesses to that purpose, and, having paid the income-tax already on this £78,000, as part of their total taxable income of £270,000, it would be calling upon them to pay the tax twice over on the same sum if they were not entitled to claim to retain the several sums deducted from stockholders on this

amount, and to assert that the interest on the amount had been paid out of the surpluses that amounted to this sum in the aggregate. He held that the claim to treat the fund paid over to the stockholders as having already borne a charge failed, as did the contention that the Crown was claiming income-tax twice over on the same sum. Seemingly, it has not yet been decided whether or not there shall be a further appeal.

Municipal Trading Profits.

The question of whether or not municipalities should run their trading undertakings with a view to securing sums "in relief of the rates," and, if so, what the proportion so realized should be, is one which crops up at more or less regular intervals, and will no doubt continue to do so for a long time to come. In Manchester, circumstances have combined to keep the rightness or wrongness of municipal trading profits very much in evidence; and Mr. J. C. B. Percy, one of the disputants, has written a letter on the subject to the local Press, one part of which is reproduced in our news columns. Leading up to this portion, the writer remarks that he finds no difficulty in drawing a line of demarcation between trading which a municipality may and that which it may not legitimately take up. Water, gas, electricity, tramways—all of which interfere with the public streets—essentially belong, he says, to that class of trading most easily managed by a corporation; but as to markets, he does not feel at all sure. Nobody, continues the letter, wants to make a profit out of water; but, at the same time, it should not be sold at a loss to firms for manufacturing purposes. From markets, gas, electricity, and tramways undertakings, however, the ratepayers are perfectly justified in demanding a fair return on the liability they have incurred, though "unduly inflating the price" of any commodity "to create an artificial profit" should be guarded against by Act of Parliament. Well, we know now what steps Parliament is prepared to take in specific instances to do away with any possibility of this kind. But an "artificial profit," even when mentioned in the course of an argument, needs some sort of definition; and Mr. Percy goes on to suggest that 3 per cent. would be an equitable return. The reason he advances for holding the view that the ratepayers as a general body are entitled to rate relief from undertakings which, in some cases at least, are entirely supported by a section only of them, is that in his judgment the "policy of placing the responsibility of an enormous debt upon the ratepayers without a corresponding return is wrong in principle and ruinous in practice. The result can only be that either most desirable reforms will be postponed, or the ratepayers will be unable to bear the increased strain of their cost, and the rates will reach a point when any advance would yield no increase." As to this, all that need be said is that, if profits must be drawn from municipal trading undertakings, for the benefit alike of those who support them and those who do not, then it would be certainly better that the amount of such rate relief should be regulated by Statute than that it should be left in the power of, perhaps, hardly-pressed Finance Committees to bring pressure to bear on Trading Committees to hand over greater sums than may be considered wise by those who should be the best judges.

Daylight Saving.

The Daylight Saving Bill, it is announced, is to be introduced again this session; and, though the Government on the last occasion refused, after inquiry, to give any special facilities for the passing of the Bill, and declined, as the Government, to support it, Mr. Willett, the author, is a very happy man. Mr. Winston Churchill is one of his latest converts; and he is a powerful one. If there is one thing Mr. Willett is to be admired for, it is his perseverance, and his robust faith in the eventual success of his proposal. He works at it "real hard." A solid 230 members of the House of Commons have now expressed themselves favourable to the principle of the measure; 163 local authorities are in favour, nearly 50 trade unions, 45 chambers of commerce, 54 clubs, and 64 associations and societies. Support spreads. The idea has taken root in Belgium; and a Bill is about to be introduced there for the purpose of altering the time of day. It is stated that it is proposed to adopt Greenwich time in spring and summer; and from the third Sunday of each September, Central European time. The objects to be served are as here—recreation, health, and saving of artificial lighting.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 547.)

THE Stock Exchange had another bright week, cheered by plenty of buying orders and rising markets, coupled with easy money. A cloud arose in the Far East late in the week and gave rise to uneasiness, which was, however, in great measure allayed before the close. Railways were the focus of attraction from day to day, and even a good deal of realizing to secure profits seemed to administer only a temporary check. On the opening day, business was not at full pressure, but the tone was satisfactory. Rails were strong and full of rise, Consols were steady, Americans were unchanged, and Foreign uneven. Secured Breweries were still in demand. On Tuesday, the leading departments were still strong and active, especially for gilt-edged qualities and Rails. Wednesday was quite bright and cheerful. Government issues were firm and in good demand; but Consols were again without change. Rails continued strong; and though some profit-snatching had to be encountered, the forces were well matched. On Thursday, the reaction in Rails seemed to affect Consols sympathetically, to the extent of $\frac{1}{8}$ for money and account and $\frac{1}{4}$ for specials. But the other gilt-edged class did well. Some of the speculatives were dull; but Beer was strong still. Friday's factors pointed downwards. Possibilities of troubles in China caused Consols to be not quite so firm, though the quotations did not fall. Railways were sold in the morning, but were as strong as ever in the afternoon. The Foreign was, of course, dull. Things were brighter on Saturday, feeling less nervous in regard to China; and the general tendency was more favourable. In the Money Market, the supply was fully abundant for short loans. Discount rates at first were easier; the expected fall in the Bank rate (from 4 to $3\frac{1}{2}$ per cent.) becoming a fact on Thursday. But looking ahead to dearer money in the quite near future, rates then hardened. Business in the Gas Market was more active than the week before, and the tone was just as good; but only a few quotations made further advances. However, this could scarcely be expected. In Gaslight and Coke issues, the ordinary was moderately active and very firm at the same figures as the previous week—$107\frac{1}{4}$ to 108. In the secured issues, the maximum was done repeatedly at $88\frac{1}{2}$; and the preference was busy at from $103\frac{1}{2}$ to $104\frac{1}{2}$. South Metropolitan changed hands at from $118\frac{3}{4}$ to 120. In Commercials, the 4 per cent. marked 116; and both it and the $3\frac{1}{2}$ per cent. advanced a point. Among the Suburban and Provincial group, Alliance and Dublin realized 83, British $44\frac{15}{16}$, Bromley "A" 117, Tottenham "B" $115\frac{1}{2}$, ditto debenture 99 and $99\frac{1}{2}$, and (on the local Exchange) Liverpool "B" $164\frac{3}{4}$. In the Continental companies, Imperial was quite active and stronger, transactions advancing from $185\frac{3}{4}$ to 188—a rise of $1\frac{1}{2}$. Union was done at from 95 free to 97 (a rise of $\frac{1}{2}$), and ditto preference at 137 free—a rise of 1. European fully-paid made $26\frac{5}{8}$ and $26\frac{7}{8}$. Among the undertakings of the remoter world, Bombay changed hands at from $6\frac{5}{8}$ to $6\frac{7}{8}$, ditto new at $5\frac{1}{4}$, Cape Town preference at 6, Monte Video at $12\frac{3}{4}$, Primitiva at from $7\frac{11}{16}$ to $7\frac{7}{8}$, ditto preference at from $5\frac{1}{4}$ to $5\frac{7}{16}$, and San Paulo at $15\frac{3}{4}$ and $15\frac{13}{16}$. Malta was done at $4\frac{15}{16}$.

ELECTRICITY SUPPLY MEMORANDA.

Publicity—Enlargement of Activity—Composing Internal Difficulties—Electrical Notions of Fair and Open Competition—Manchester Illustrations—Capital Expenditure and Reduced Proportion of Profit—Ethics of Advertising—Steamy Shop Windows—Coronation Illuminations.

JUDGING from the extent of their operations up to the present, the Electricity Publicity Committee appear to command a fair amount of support for their general campaign in the interests of electricity; but, of course, they take pretty good care not to divulge to their opponents the exact strength of the financial aid that falls to them, though the subscribers themselves are no doubt kept informed as to the position of the finances, and as to the character and measure of the work performed. While the electrical activity is continuing, the gas industry is discussing, in its own leisurely way, whether local publicity schemes suffice, or whether something more is required. There are officials, too, who are extreme formalists, or who incline to the view that their dignity is more important than a great and catholic cause, and so decline to back up the circular forwarded to their chairmen by the Committee to whom has been delegated the duty of organizing the gas publicity work. The Committee are, in the main, officials themselves, and are the representatives of the officials of the gas undertakings throughout the country. It is to be hoped that nothing more will be heard of personal vanity and dignity of office being wounded, by a Committee following what was believed at the time to be—rightly or wrongly need not now be discussed—the wisest course. The work the Committee were formed to prosecute is something that is far beyond personal considerations.

While the gas industry tarries, the publicity activities of the electrical industry are extending. We read that the Joint Conference of London Electric Supply Authorities has passed the following resolutions: "(1) That with a view to further developing the commercial side of the electric-supply undertakings of London, the Conference do co-operate with the Electric Supply

Publicity Committee, particularly with a view to raising a special fund of about £1500 for advertising, including an extended display of large-size posters on the principal hoardings throughout London; (2) that the joint secretaries invite those borough councils and companies' undertakings not at present represented on the Joint Conference of London Electric Supply Authorities or on the Electric Supply Publicity Committee, to contribute to such fund." This applies only or chiefly to London; but we quote the news in order to show that the work of publicity is going forward with increased vigour in the electrical industry, and that there is an expanding belief in a campaign having universal objects. What started in London has spread to the Provinces; and there is going to be, so we are warned, no abatement of electrical vigour, but rather a speeding-up. This means that continuously the false tidings are to be borne to mansion and cottage, to factory and workshop, to big emporium and the humblest trader's shop, and to all that lie between the largest and the smallest—That electricity is cheaper than gas for lighting; that it is as cheap as gas for cooking and heating, because most of the heat units of gas prefer to escape to the open *viâ* the chimney rather than perform useful work; that electricity is safer than gas; that gas impairs health and abridges life; that on combustion it yields products of marvellous toxic properties; and that there is the noisome smell of sulphuretted hydrogen (as asserted in the Reading and other electrical advertisements) where it is burned. It is a business-getting campaign by the propagation of falsehood and misrepresentation; and this sort of thing cannot be allowed to continue indefinitely. We must spend freely and wisely on the antidote.

The electrical industry, too, is striving to get rid of some part of its load of intestine troubles, in order to put itself in better fighting trim. Municipal electricity undertakings have far and away the larger share of the electricity business of the country; and many of their managements dearly want the power to wire, and supply fittings to, premises. But the electrical contractors have, save in a few isolated cases, defeated them all along the line in their efforts to secure the power; the contractors looking upon the proposals as being somewhat predatory. Then came the project for a special combined municipal Bill this session. The contractors again showed their claws; and it has just been announced that their Association obtained guarantees amounting to nearly £2000 as a fighting fund for the purpose of opposing the Bill. The contractors were also strong in the knowledge that the House of Lords have clearly and consistently shown a sympathetic side to the private trader's plea for protection against the extension of municipal powers in this direction. These are considerations that the would-be promoters had to consider. They were also faced with the difficulty that they were unable to approach Parliament with a united front, and that financial support to the Bill was being rendered mostly in driblets. Taken altogether it was not a very exhilarating prospect that was before them. As we surmised, these are the causes for the non-appearance of the Bill this session, and for the attempted *rapprochement* between the municipal owners and the contractors. Conference, it is said, is still proceeding peacefully; but its protracted character rather induces the feeling that a pacific agreement is a difficult matter. The fact is that, powerful as the municipal authorities are in some respects, the contractors recognize their own superior position in this particular. We can quite imagine, therefore, that they are not willing to give away any advantage without seeing a *quid pro quo*.

The conferences held between the Manchester Corporation Gas Committee and the Electricity Committee, with the view of ascertaining whether they cannot settle their differences, and agree that the one and the other are above reproach in their business methods, have not yet come to anything definite. But it is patent that the Gas Department have good cause for complaint against the conduct of the business of the Electricity Department. Alderman Gibson, the Chairman of the Gas Committee, has, among other points, provided a couple of illustrations. In one case the Electricity Committee have agreed with a builder to supply him with electricity for the lighting of 400 houses, and in another case with a builder in respect of 100 houses, at a low price through a single meter, on condition that no gas or oil is used in the dwellings for lighting—the landlord recouping himself for the electricity consumed through an extra charge on the rent. This is an old electrical trick; and it is doubtful whether any such agreement can be long maintained. In the first place, if a landlord is going to make it obligatory on a tenant to use one form of illuminant, he will find before he is much older that it will affect the letting of his property. In the second place, it is questionable whether the statutorily regulated Electricity Department has any power to make a condition which violates a right with which every householder is invested by Parliament, of being able to select one or both lighting agents, and, on certain terms, compel the undertakings to supply him. We do not know the price per unit at which this electricity is to be delivered to the builders for lighting; but it would seem that it is at a price below the charge at which other private consumers are being supplied for the same purpose. The "Electrician" defends the Electricity Committee's action, and, in effect, urges that Alderman Gibson's charge, that the Electricity Committee are doing an "improper, unbusinesslike, and unfair thing," is tantamount to a request that competition between the Committees should cease. The position taken up by the veteran gas administrator is, not that there should be a discontinuance of competition, but that competition should not be conducted on unfair lines. The "Electrician" is not logical. It says: "If there is to be no competition, then the general public will suffer." We quite agree. Therein is one strong objection to the condition attached to the supply of electricity for the lighting of the two groups of—no less than 500 in all—houses, that neither gas nor oil shall be used in them for lighting. The condition shuts out all competition in the case of these dwellings; and therefore the "Electrician" must agree that the proposal of the Electricity Committee is not to the public advantage, and strikes destructively at what should be a fundamental principle in the provision of utilities by municipalities—the fullest freedom on the part of every citizen, or every householder, in the areas of supply, to exercise the right, given him by Parliament, to confer his patronage on either or both departments at his own discretion.

Another interesting point is made by Alderman Gibson. It is a point that has exemplification in several other municipal electricity departments. It is that the greater the capital of the electricity undertaking grows, the smaller in proportion is the profit. In 1900, with a capital of £641,000, the Electricity Department made a profit of £9765; and last year, with a capital of £2,678,000, a profit of only £12,000 was netted. The fact of the matter is that, on the lines on which the electricity business is conducted—there are, of course, exceptions in exceptional districts—the greater the capital grows, the smaller becomes its average profit-producing capacity. The cream of the business for electricity undertakings was obtained at their outset; and now the smaller consumers and electricity supplied at cut prices for purposes other than lighting, yield a very attenuated return on the capital.

One of the more serious of our electrical contemporaries ought to read the Reading Electricity Supply Company a sharp lesson on the ethics of advertising. The Company seem devoid of common courtesy, and are not at all particular as to whether or not their choice of point in trying to obtain business through advertisements bears the character of truth or otherwise. But possibly the Company's excuse for entering upon oblique ways will be that they have been very hard hit, that their shareholders' yearning for dividends does not lessen with the progress of time, and that on the whole existence is somewhat a misery to them. Some time ago the Electricity Company discovered that Dr. Jamieson Hurry, one of the Directors of the Gas Company, had, in a contribution made some time since to the "British Medical Journal," remarked that an ill-ventilated gas-lit office was likely to cause certain physical troubles; and the Electricity Company made use of the discovery in their advertisements in the Reading papers. In the "JOURNAL" for Nov. 8 last (p. 384), it was pointed out that Dr. Hurry had written to the local papers in reference to the quotation from his former article; and among his remarks were these: "To anyone familiar with the overwhelming influence of adequate ventilation on health, it will be obvious that want of ventilation in any office is highly prejudicial, and that what was said would apply, *cæteris paribus*, to an ill-ventilated office even if lit by the electric light. Indeed, much evidence has lately been adduced to show that gas is more useful than the electric light in promoting efficient circulation of the air. It is for this, among other reasons, that gas is being frequently substituted for the electric light." After this, one would have imagined that the Electricity Supply Company would have had the common courtesy to refrain from quoting Dr. Hurry's former article, or, if they still considered it valuable, despite his subsequent expression of opinion, to cite the latter statement alongside the former one. To persist in the publication of the single-sided statement, having regard to the personal aspect of the matter, shows not only sad want of good taste and courtesy, but to us it savours very much of petty spitefulness, superior to which the Chairman, Directors, and Officials of the Reading Electric Supply Company should surely be. Then there is the point as to the publication of an untruth. From a very, very ancient writing of a certain Dr. Carpenter (who obviously did not know much about the matter), the Company in their advertisements quote this: "Gas in burning gives off quantities of sulphuretted hydrogen." If any electrician who quotes this essayed to publicly prove it by demonstration, he would look very foolish. By Act of Parliament, gas suppliers are compelled to entirely remove the sulphuretted hydrogen from the gas. It is one of the easiest impurities to remove; and the official reports of the gas examiners of the local authorities at Reading and elsewhere prove how completely it is done. What have the Reading Electricity Company to say in justification of their action in quoting something they cannot possibly substantiate? It seems ages now since we challenged Dr. Carpenter to prove his assertion. So far back is it that we forget the date when he made it. Will some of our electrical friends kindly supply the date; and at the same time inform us whether Dr. Carpenter is still in the land of the living, and, if so, where he is to be found? We should much like to have a word or two with him.

Can any of our readers assist a correspondent of the "Electrical Times?" He is evidently an electrician sorely in need of advice over a trouble that electricians used to say was a difficulty that was peculiarly the property of gas-lights. The trouble of this particular correspondent of our contemporary is the steaming on the inside of a dust-tight shop window case due to the heat caused by the metallic filament lamps employed inside. The use of a fan is not permissible on account of the disturbance of the pendant lamps and price tickets. This latter point is almost as interesting as the first. Electrical fans must not be used where metallic filament lamps are suspended on flexibles, as the latter have a grave objection to persistent vibrations. But as to the

price tickets jumping about through the use of an electric fan, that should be a valuable means of advertising. It would immensely tickle the shop-window inspecting public to see the tickets fluttering about through some unseen influence. But, on the other hand, without the fan, the shop window case should make a decent incubator.

Throughout the country, electricity suppliers are making special terms for the energy to be used for special illumination purposes at the time of the Coronation. The price is generally put at 1d. per unit. In a few places, it will be somewhat higher than this, but below the ordinary lighting rates. Electrical managers mean to be in good time in competing with gas undertakings for securing a large display of electric lighting during the celebration. Gas managers will see to it that they are not behind in the running. Some excellent gas devices are on the market; and installation work can be done as cheaply as for electrical illumination, and without fire risks. Not long since attention was called in these columns to the report of the Chief Officer of the London Fire Brigade as to the necessity for several precautions being taken to protect the public from danger in connection with temporary electrical installations for the Coronation.

THE OPPORTUNITY OF AN INSTITUTION.

By "Assoc.M.Inst.C.E."

There generally comes a time in the life of a professional institution, as with an individual, when a variety of circumstances seem to point strongly to the taking of stock, as it were, and the adoption of a change of policy. It appears to the writer there is not wanting evidence that such a time has arrived—even if it be not overdue—in the case of the Institution which is assumed to represent, however imperfectly, the gas industry. In the "Journal" of a fortnight ago, he set out what he regarded as the first function of an institution; and last week he considered "The Defects of an Institution"—inadequate representation, defective force, imperfect co-operation, incomplete organization, dilatoriness. As was noted in the previous article, so in this one, the corroborative views of others, bearing on the general tendency of the topics under consideration, are unexpectedly forthcoming. Thus, in an eminently reasonable and moderately toned article relating to "The Institution and Its Appeal for Funds," Mr. Arthur Valon, Assoc.M.Inst.C.E., writes: "The Institution is not only a purely professional association; but does not even contain representatives of all branches of the industry." And he goes on to ask "Why should not the Institution be widened so as to represent the financial interests in the gas industry, as well as the professional or official element, and thus become completely representative?" He concludes by putting another query: "Is it too much to hope that the industry will awake to the necessities of the situation before the opportunity has passed away?"

Then another writer, "R. W. E.," in the same issue of the "Journal," asks "What is the future of the gas industry?" He realizes that "we have got to shake off old ideas and methods" and "drop old facts and fancies," and "be ready to adopt new ideas and systems." And yet further, the same kind of spirit is found in the letter of "A Country Manager" upon the subject of "The Publicity Campaign;" for he concludes by saying that "this is a democratic age, and any attempt to run this campaign on exclusive lines is doomed to failure."

From these three different contributions, it is abundantly clear that there is abroad in the minds of many the feeling that all is not right with the representation of the gas industry, and that the time is now opportune for something to be done. This, then, is the opportunity of the Institution of Gas Engineers, not to hold a kind of official inquiry by the Council within closed doors upon their own doings, good or bad, but to invite the fullest investigations, and the widest suggestions, from all interested before an open court. If there was a special meeting called by members of the Institution, to which all interested, whether members or not, might come, and a general conference be held to view the situation and outlook, surely some good might result from it. A Special Committee might then be chosen from the open meeting, and the suggestions made, criticisms passed, and recommendations thrown out, could be thrashed out in committee and reported upon. Within a month all might be concluded, and practical concrete proposals be laid before a general or the annual meeting of the Institution.

All details are bound to be carefully considered and drafted at some leisure in committee; but to the writer it appears that there is ample opportunity for improvement in the organization of the industry, and what is more important, that the time is ripe for directing and using the desire for reform that he believes to be actuating the minds of many.

Two things are certainly clear. That the doors of a representative institution must be thrown wide open, and that the funds available must be largely increased. In short, both men and money are wanted. The writer suggests that gas undertakings themselves should be admitted to membership; for a gas company is, both in law and in fact, a distinct and separate entity. The Institution acts for the good of the company, and the company should act for the good of the Institution, and take part in its proceedings. Whether the chairmen of gas companies or of corporation gas committees should represent their undertakings or not, such gentlemen should, as individuals, be allowed and induced to become members of the representative gas society. The present class of professional member should be increased only by qualified candidates; and the test of examination should be adopted as early as possible. The subscription fees of this class should be doubled; and probably a distinction in this respect should be made between London and country members, as is done with the Institution of Civil Engineers. Likewise, analogous classes of "Associate Member" and "Associate" might be adopted, and in some such way all those interested in affiliated industries brought in to participate in the work of the Institution.

By such means, the strength of numbers would be obtained, the prestige of membership raised, and the financial stability of the Institution be increased. Then would the ramifications of such an organization, actively administered by various sub-committees, be found to spread much more powerfully for the general good of the industry and of the community. Proper premises might be taken in a prominent thoroughfare—not a back room in Victoria Street—show-rooms opened, and the public attracted and educated. Permanent funds for exhibition purposes established, laboratory work encouraged, and individual investigation assisted. A true and abiding publicity campaign would thus be well founded, and the means of carrying it on with ever-increasing effect secured.

To some, such ideas may seem almost visionary, and perhaps entirely impracticable. But when one remembers the vastness of the gas industry in Great Britain and its long-continued, dividend-paying prosperity, it is surely not too much to expect that both men and money would be forthcoming, if only definite benefits and a strong organization could be shown to exist. If, of course, individual managers and controllers of the gas industry are content to continue in the narrow groove of quiet and quasi-monopoly, and shut their eyes to the advantages of united and of forceful effort, they must abide by their choice. To change anything needs effort and enthusiasm. If these are forthcoming, as the writer believes may be the case, the advantages accruing from strong and active organization will redound to the general welfare of the gas industry as a whole, and to the benefit of the gas manager as an individual.

TOKYO GAS COMPANY.

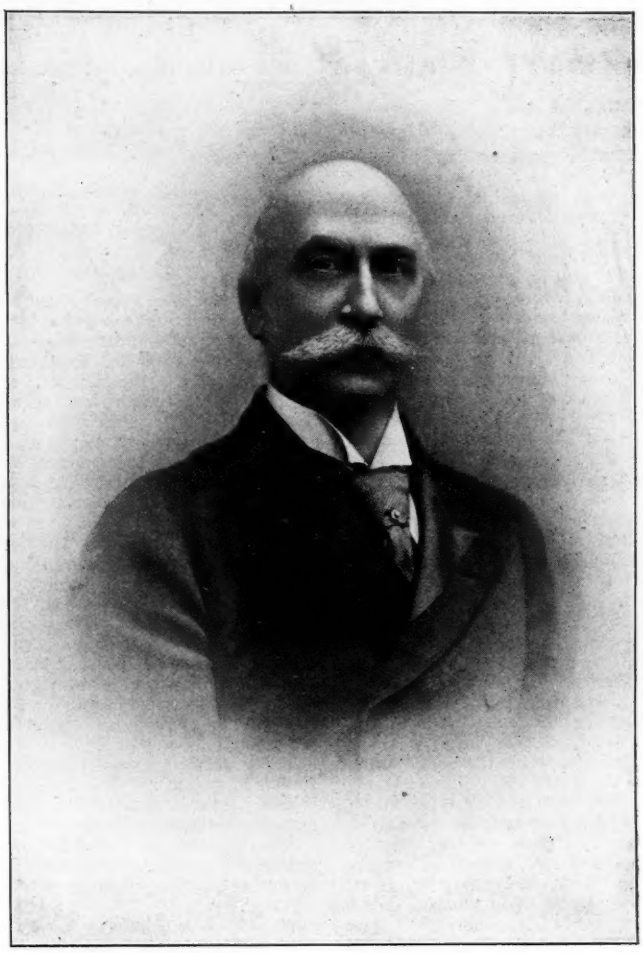
Twenty-Fifth Anniversary.

A very handsome album has been prepared in commemoration of the twenty-fifth anniversary of the establishment (in October, 1885) of the Tokyo Gas Company; and a copy has been forwarded to us by Mr. S. Hiramatsu, a Director and the Chief Engineer of the Company. The illustrations, which are grouped respectively under the Engineering, the Treasurer's, and the Sales Departments, and the descriptive letterpress in Japanese give an excellent idea of the offices and works, &c., of the Company; and numerous statistics set forth the great progress that has been made by the undertaking.

At the time of the establishment of the Company (when the business rights of the Gas Bureau, under the administration of the City, were handed over to the Company), the capital stock was 270,000 yen; and the consumers numbered 343. As the result of continuous development, however, there is now being supplied about 5,000,000 cubic feet of gas per day to more than 100,000 consumers; while the capital stock, which has already reached 17,000,000 yen, is very shortly to be increased to 35,000,000 yen. In 1885, the revenue of the Company was 18,960 yen; the expenditure, 11,612 yen; the profit, 7348 yen; and the dividend, 10 per cent. In 1909, the revenue was 5,325,422 yen; the expenditure, 3,528,306 yen; the profit, 1,797,116 yen; and the dividend, 13 per cent. As already mentioned, in 1885 there were 343 consumers. In 1895, this number had increased to 20,312; in 1905, to 31,455; and in 1910, to 109,937.

Views are given of the four gas manufacturing stations; and also of the Sunamura coke-oven works, where the gas, tar, &c., are treated as bye-products. The aggregate monthly output of the Sunamura works is 1000 tons. In addition, there are a gasholder station, two governor stations, and two products works, besides depôts for the sales department, meter works, repairing shops, stores, &c. It is obvious from the photographs that the show-rooms are replete with every modern device for the utilization of gas. There are also included in the volume illustrations of some good indoor lighting, heating, cooking, bath, and street lighting installations. In reference to heating-stoves, the remark appears: "Mostly imported from England, America, Germany, Switzerland, &c."

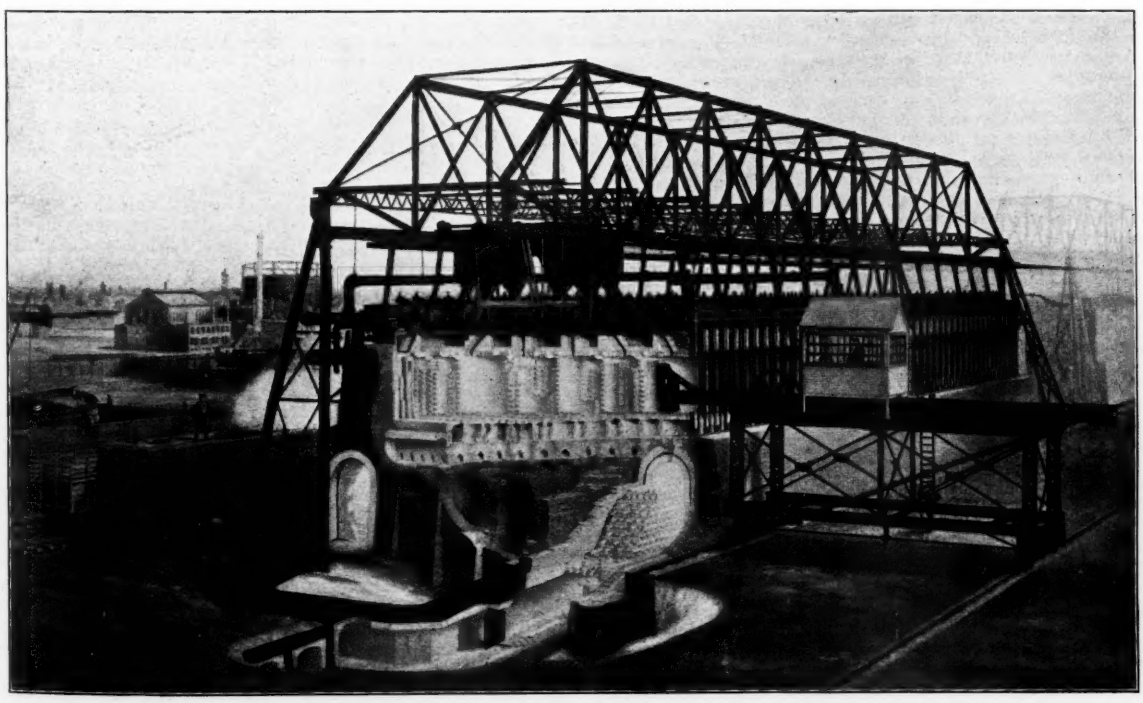
Masonic.—About a hundred Freemasons assembled at the Freemasons' Hall, Stockton-on-Tees, on Thursday last for the celebration of the annual festival in connection with the Lodge of Philanthropy (No. 940), when Bro. Matt. Dunn was installed in the chair. Subsequently, a banquet was held, at which the usual Masonic toasts were honoured, and congratulations were extended to Bro. Dunn upon the honour which had been conferred upon him. Several visitors from the Northern Star Lodge were present—W. Bro. John Mackay, W. Bro. Wm. Batt, W. Bro. S. R. Ogden, and W. Bro. J. E. Williams. Among the visiting brethren from other Lodges were: Bro. Andrew Mackenzie, Bro. James Maclay, Bro. Frank P. Tarratt, W. Bro. J. W. Scott, and Bro. William Ford.



MR. H. H. SALOMONS, OF BRUSSELS,

who is this week celebrating the Jubilee of his connection with the Imperial Continental Gas Association—being entertained to dinner by the Directors, and made the recipient of many souvenirs of the interesting occasion, from the Board, from his colleagues at the other stations of the Association, and from the engineering staff at Brussels. Some particulars as to Mr. Salomons' professional career appeared in the "Journal" on the 31st ult., p. 283.

[Reproduced from a Photograph in "Het Gas."]



THE OTTO-HOFFMANN BYE-PRODUCT COKE-OVEN PLANT AT CAMDEN, NEW JERSEY.

This type of plant has been in operation in the United States for the past eight years, as referred to in a letter from Mr. Edwin A. Moore (of the American Coke and Gas Construction Company) appearing in our "Correspondence" Columns to-day.

FESTIVAL OF EMPIRE EXHIBITION AT THE CRYSTAL PALACE.

A Large Scheme of High-Pressure Gas Lighting and Gas-Generated Electricity.

The Crystal Palace and the beautiful slopes of Sydenham Hill forming the grounds of the famous building, will this year supply the setting to a unique exhibition and spectacular displays of, for London, unrivalled splendour. For the purpose to which they are to be devoted, there is no place in existence that could be their equal. The Palace itself and the grounds as we have known them the past few years are now undergoing a metamorphosis which will show them in an altogether new character. It is here that the Festival of Empire Exhibition, with its Pageants, is to be held; and the Palace itself, with its exhibits drawn from every quarter of the Empire, the extensive grass-clad and wooded grounds, with the numerous towered, minareted, and domed palaces and buildings, special amusements and sights, will, combined, have a magnetic influence, and will stand as a rival of the first magnitude of all other attractions that will be specially made for this the Coronation year of King George V. The Committee who are organizing the great display embrace numerous distinguished and eminent men—who have entered upon the scheme with the view of making it, so far as lies within their power, a conspicuous success.

Such an exhibition, which will attract numerous visitors after the day's work is over, will naturally require an extensive system of illumination, and a not inconsiderable amount of power; and that is the side of the exhibition in which, in pages given up entirely to the technical and commercial interests of the gas industry, we are mainly and directly concerned. Let it be said at once that the industry—through the recognition by the Chairman and the Directors and the Engineer of the South Suburban Gas Company of the exceptionally grand opportunity there is for demonstrating some of the latest progress of gas, and so serving not only their own interests but also those of the industry at large—has to its credit another valuable success, and what is more has obtained it in direct competition with the local Electric Light Company. When reference to this success was made at the meeting of the South Suburban Company last Friday by the Chairman (Mr. Charles Hunt), the proprietors presented, by the expression of their appreciation, their congratulations—in which the gas industry will unite, as we do most sincerely—to the Chairman and Directors, the Engineer (Mr. S. Y. Shoubridge), and all who have had any part in bringing about this victory. The Board and their chief executive official looked upon it as a responsibility devolving upon them to secure the contract; and, this being the spirit in which they entered upon the big scheme, there may be the full assurance that it will continue to the completion of the installation work, and throughout the run of the exhibition. This being so, we look with confidence for a continuing brilliant result.

It will have been gathered that the contract is an extensive one; and a few words before going into details will show it to be so. The contract practically comprises two parts. On the one hand, it embraces the lighting of all the grounds of the Crystal Palace, and one-half of the Palace itself, by high-pressure gas; and, on the other hand, the Company have contracted for supplying the power, by means of gas-engines, for generating the electric current required for lighting the buildings which are being erected in the grounds with electric lamps, and for driving the "All Red Route" Railway, which will doubtless convey millions of people this summer from colony to colony, through miles of scenery typical of the various countries represented. As we proceed with the description of the plans for carrying out the contract, its immensity and importance from the demonstration point of view will be seen. But a first good impression of this will be obtained when we say that the high-pressure gas scheme alone involves approximately 200 inverted gas-burner lamps, all of high power, some considerably so. And we need hardly point to the value of the demonstration which will prove that it is possible to generate, at the place where required, with mammoth gas-engines supplied by town gas, electricity at a price that competes favourably with the figure at which a central generating-station can supply.

High-Pressure Gas Lighting Inside the Palace.

Now to the details of the scheme covered by the contract; and we will take first the lighting of the Palace itself. The portion of the building which will be lighted by gas is the lofty and extensive North Nave, which runs from the celebrated great organ to the North Tower; while the South Nave—the part of the Palace running from the organ to the South Tower—will be lighted by gas-generated electricity. The gas and electric lights will therefore be under equal conditions in the matter of environment; and they will have to rely entirely for their efficiency upon their individual merits. Under such circumstances, the public will have presented to them an excellent opportunity of making a fair comparison of the two illuminants as represented by the respective exponents of high-power lighting.

In the North Nave, the high-pressure gas-lamps will be suspended from the upper gallery on each side of the nave at a height of about 27 feet from the floor, and will be spaced about 50 feet apart. Each lamp will contain two burners, and will give a light of about 3000-candle power. They will be similar in design to those (Keith inverted) now lighting Cannon Street from the railway station to the end of King William Street. The space under the galleries and near to the side Courts will be illuminated by similar lamps, having one burner each, and giving approximately 1500-candle power. These will be spaced about 25 feet apart. There can be no doubt that this end of the Palace will be lighted with a brilliancy far surpassing anything seen there, or indeed anywhere else, before.

The pressure at which gas will be supplied will be equal to 60 inches; and this will be obtained by a special pressure-raiser, driven by a gas-engine, which is being erected at the north end of the building.

Lighting the Grounds.

From dusk the Palace Grounds will present a scene of illuminated splendour such as has never been witnessed there before. As a matter of fact, they have not previously been lighted after dark, if we except the illumination of the Terrace and North Tower Gardens in the summer. But this year they will be lighted at least as brilliantly as was the White City last year. The main avenue through the grounds, from the Penge Entrance to the entrance to the Palace on the upper terrace, will be lighted along its lower half by a single row, and along the upper half by a double row, of high-pressure lamps, similar to those in use in Whitehall, Piccadilly, Regent Street, and neighbouring arteries of the West-End. They will be mounted on ornamental steel standards about 20 feet high. The upper and lower terraces also will be lighted by similar lamps. Some will be of 1500, some of 3000, and some of 4500 candle power. Altogether, there will be about 170 of these high-power lamps in the grounds; and when to the light they will give is added that from numbers of similar lamps which will be erected by the various Mountain Railways, Magic Caves, and other "side shows," and that from the electric incandescent lamps outlining the immense buildings representing the Parliament Houses of the various colonies, it will be realized that the scene at night will be brilliant in the extreme, and worth journeying many miles to see.

There will be a special pressure-raiser worked by a gas-engine similar to that in the Palace, installed in a suitable building which is being erected near to the Penge Entrance, for increasing the pressure in the mains in the grounds.

Special mains are being laid throughout the grounds for this lighting, the extent of which will be realized when it is known that upwards of 4 miles of pipes, varying in size from 4 to 8 inches, are required.

The Gas Power-House and Electricity Station.

Now to the second side of this notable scheme. The South Suburban Gas Company have, as already stated, undertaken to supply the power required for electric lighting and for working the railway, as well as some of the "side shows;" and to do this, they are erecting a building, which measures 66 feet long by 50 feet wide, and 35 feet high, in a central position in the grounds, adjoining the Australia and India buildings. It will be constructed of a steel framework and roof strengthened by concrete, with an integument inside and outside of fibrous plaster—the whole design harmonizing with the adjoining buildings. The power house will contain two 1000-horse power and one 750-horse power "National" gas-engines, which are to be coupled to three double-voltage continuous dynamos, having a combined normal output of not less than 4000 amperes at 450 volts. These dynamos will be so constructed as to deliver current at either 225 or 450 volts. as may be required. They, with the switchboard and all the electrical apparatus, will be provided by the Festival Authorities, who will also arrange for distributing the current in the Palace and grounds, lighting the buildings, &c.

Certain it is that this power house, with its gigantic engines, will be one of the most interesting sights in the Exhibition, and, it is safe to say, will attract a vast crowd of visitors, especially those who are interested in seeing the cheapest and best way of generating electricity either for light or power. Some idea of the magnitude of the installation may be gathered from the fact that it will require a 12-inch gas-main to supply the engines alone.

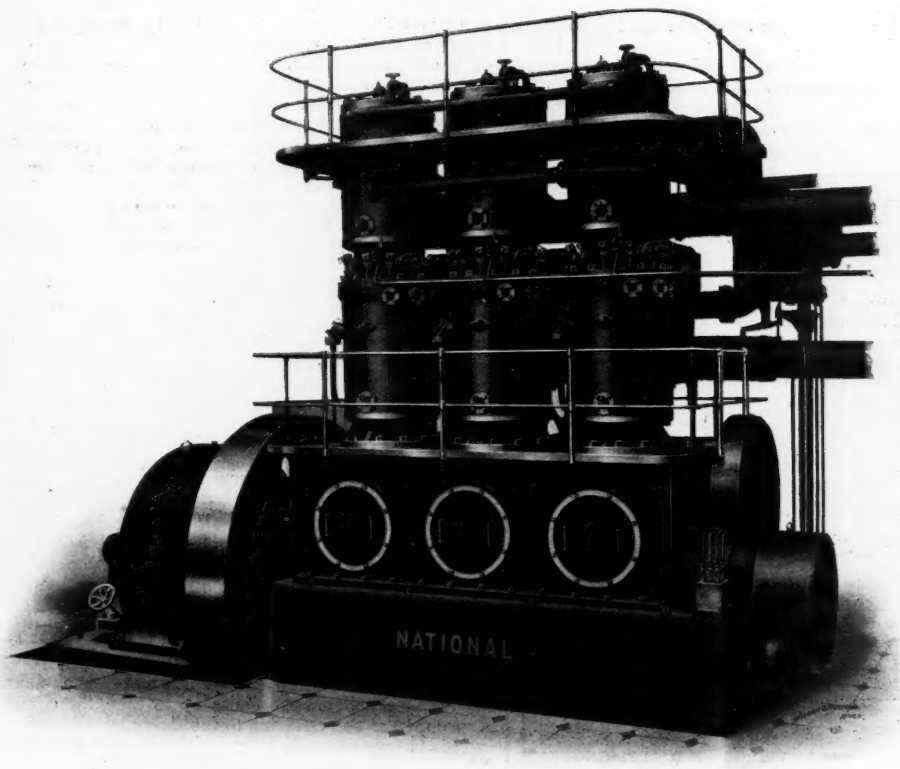
In addition to the three giants of the gas-engine family, quite a number of smaller engines from 50-horse power downwards, are being erected in the grounds, for driving and lighting the various amusement edifices, which are being erected, and will be run, by private enterprise.

An Object-Lesson Display by the Gas Company.

The Exhibition proper inside the Palace promises to be a very attractive one; and already nearly all the space has been taken. The South Suburban Gas Company have secured a considerable space in the south end of the nave, adjoining the stand of Messrs. Elkington and Co., the famous silversmiths, and close to the great fashion show which is being organized by the proprietors of the "Daily Mail." The Gas Company do not intend to make an exhibit of the old-fashioned kind—such as a display of fires, cookers, and fittings—but are making arrangements for some interesting process of manufacture in connection with gas, with operation by skilled workers, as the main attraction.

In its Proper Place.

It will be seen from the account we have given that gas will take its proper place, as a lighting and power agent, at this Empire Festival; and a striking proof will be afforded to the multitudes



View of one of the three "National" Gas-Engines for the Empire Exhibition Power-House.

[As mentioned in the article, there will be, in addition to the engine illustrated, two others of 1000 and 750 Horse Power.]

who will throng the Exhibition, that it can hold its own with any other illuminant for purposes of great display, as well as for all commercial or domestic uses.

Our readers will, we are sure, agree that the Directors of the South Suburban Gas Company deserve the unstinted thanks of the gas industry throughout the world for their enterprise in keeping the advantages and possibilities of gas well in the forefront in this unique and colossal exhibition.

THE PUBLICITY CAMPAIGN.

Good Reasons for Universal Support of the Gas Publicity Committee. Illustrations of the Activities of the Electricity Committee.

A PREFATORY word to Mr. H. B. Renwick, the Chairman of the Electricity Publicity Committee, and to members of the Committee. We shall take as already proposed and passed the vote of thanks that might (if we did not modestly make this preannouncement with the view of saving our friends trouble) come to us for the splendid advertisement we are about to give to the new batch of circular literature that the Committee are issuing for sale to, and distribution by, electricity supply undertakings, for the purpose of inducing the turnover of householders and business men from gas to electricity. As a matter of fact, our principal object is not so much to advertise the literature as to use it as a lever for stirring up those gas undertakings who are of opinion that their own local publicity work is sufficient, and those lethargic gas directors and managers who take no interest in the matter of providing a proper central organization and agency for meeting the products of the Electricity Publicity Committee, and for initiating fresh lines of propaganda.

This being our chief object, we shall not stay on this occasion to reply to the misrepresentation of gas, or to point to omissions and exaggerations in the circulars, which omissions and exaggerations, in our view, constitute falsity quite as much as its direct utterance or writing. There is much in them that requires immediate correction in circulars containing honest fact. In every instance where gas is attacked or slandered directly or inferentially rebutting evidence can be adduced, and the sooner gas undertakings justify, by financial support, the Gas Publicity Committee setting actively to work the better. What the Electricity Publicity Committee are doing must surely act as a stimulus on gas managers—administrative and executive—and must compel them to take still stronger retaliatory measures.

Altogether, there are sixteen of these new circulars before us. Here we have first a natty one of four pages, printed, in two colours, in fancy type and illustrated, and headed "Electric Light and Spring Cleaning." In this, the householder is plainly told that, "unless electric light is used in the house, the good effects of spring cleaning will be lost in a few months at the most. The usual disheartening dinginess will begin to appear almost as soon as the spring cleaning is finished." Naturally, the householder innocently wonders why the remark is made, as he does not, in these days of inverted incandescent lamps, notice any suffering from disheartening dinginess. He is coolly told, with the customary electrical audacity, that it "is owing to the use of gas or lamps." A little later on, mention is made of "dirt," "dust," and "smoke," and the words "perfectly healthy" appear. It is all right perhaps to deal in generalities, but the stab in the back—which is a common electrical method—is clearly recognized. This circular is described as "an artistically designed leaflet, suitable for this season of the year, and appealing to non-consumers." The prices charged by the Committee are: For under 5000, 21s. per 1000; for 5000 and over, 20s. per 1000, including the printing on of the name and address of the undertaking.

Then we come across a little bundle of leaflets described as "suitable for the use of canvassers when calling upon particular tradesmen; also for enclosure with answers to inquiries. When used for circularizing and sent with other literature, such as the 'Shopkeepers' Booklet' recently issued by the Committee, they serve to give point to the application of electricity to the particular trade in question." The first is headed "Electricity for Grocers and Provision Merchants," who, having been doing it for years upon years, are now told "it would be impossible to exhibit" butter and cheese "in the window with gas without the possibility of very serious deterioration." It is also mentioned that "as no heat, or fumes, or soot are given off, the goods stored suffer no deterioration." We should much like to know what the Electricity Committee mean by "soot" from an incandescent gas-burner. We meet with the term again in the circular to florists. "There are no fumes or soot given off, as in the case of gas." Then, in the circular for butchers, in a paragraph with the side-heading "No Fumes," it is said: "Another point is that no deterioration of the meat takes place. There are no poisonous fumes or unnecessary heat to destroy its freshness." Gas escapes any direct abuse, slander, or condemnation in the circular headed "Electricity for Hotels and Public Houses." In the circular designed for drapers, it is stated that "skilful window dressing is entirely wasted under any other illuminant"—than electricity. The skilful window dressers that existed before the advent of electric lighting did not think so; and certain it is they did not then retire at night with their day garments lying within hand reach in case the terrible cry of "Fire" was raised during the hours when Nature intended the activities of body and mind to completely cease for a while. This circular, however, says "From the point of view of safety, electric light is the only light that should be allowed in drapery establishments. Electric light can be safely used in shop windows in connection with window dressing where it would be impossible to use gas with safety." The author of this circular certainly suffers from an extreme brevity of memory. Once again, we learn that, "A huge saving will also be made, due to the fact that electric light gives off no fumes, smoke, or soot to

deteriorate the goods." These circulars are issued by the Committee at 1s. 6d. per 100, excepting the four-page one for drapers, which is priced at 2s. 10d. per 100.

A circular and a leaflet bring before householders and others again the remarkable discoveries of electricians as to the toxic properties of gas, and tell them much about its poisonous fumes, and destructive products. Here is an example of one of these scandalous productions reproduced in smaller size than the original:

ELECTRIC *versus* GAS LIGHT for use in the Home.

ELECTRIC LIGHTING ought to be Compulsory for reasons of HEALTH

ELEMENTARY CHEMISTRY
for those who still continue to use
COAL GAS FOR LIGHTING

GAS		ELECTRICITY
Coal Gas consists of		
Marsh Gas		
Ethylene		
Acetylene	(Poisonous)	
Benzene		
Hydrogen		
Carbon Monoxide	(Poisonous)	
Nitrogen		
Carbon Dioxide	(Poisonous)	
Sulphur Compounds	(Poisonous)	PURE LIGHT
Yields		
Carbon Dioxide	(Poisonous)	
Water Vapour		
Sulphuric Acid	(Destructive)	
Soot		
Uses up the Oxygen which is absolutely necessary for the support of respiration.		
Results in the formation of new impurities, which are set free in the air that has to be breathed.		YIELDS **NO** POISONOUS COMPOUNDS OR DESTRUCTIVE GASES

"The prolonged inhalation of air containing only a very slightly increased amount of carbon dioxide, has a distinctly lowering effect upon the vitality."

Newth's Manual of Inorganic Chemistry.

"It appears that where air contains only 2 parts per 1000 of Carbon Dioxide, its effect in lowering the action of the pulse is rendered evident after the respiration has continued for about an hour."

Roscoe & Schorlemmer's Treatise on Chemistry.

Avoid all these dangers and discomforts by using ELECTRIC LIGHT

This circular is exceedingly elementary and very foolish; but there may be householders, tradesmen, and manufacturers who are of opinion that an electrician is a saintly being, and capable of nothing but the most brilliant truth. This circular is supplied at 12s. per 1000; but there is another "Gas *v.* Electricity" which is priced at 67s. 6d. per 1000, including the printing of the name and address of the undertaking circulating them. It should be worth that number of pounds, and not shillings, if value is measured by the designed power of the contents to frighten nervous people. This leaflet is headed "Gas *v.* Electricity for Health and Pure Air." The eight pages are chiefly occupied with well-known extracts from the reports of the various Inspectors under the Factories and Workshops Acts. They deal mainly with flueless gas stoves and gas-heated irons. The Electricity Publicity Committee do well to hide behind the reports; for they would not care to have to prove that the assertions that are made in the reports are apposite in respect of the ordinary use of gas. Will Mr. Renwick, or any member of the Committee, pledge himself to justify the accuracy of this statement: "The fumes generated from all gas-stoves are heavier than air at the same temperature. They rise solely by reason of their being at first hotter than the surrounding air, and as soon as they enter the long narrow flue they readily lose heat and form *a complete stoppage to any further passage of the fumes up the flue.*" It should be beneath their dignity to put into circulation, for persuading householders to evict gas and adopt electric heating, such a demonstrably inaccurate statement as this when applied to ordinary house flues. Anyway we might ask the Committee to definitely choose one line of argument. Mr. A. H. Seabrook was telling us the other day in "The Times" that most of the heat units of gas consumed for heating pass up the flue. The flight of the heat units, too, up the same attractive passage for such things constitutes the electrical argument against the economy of gas for cooking. Now how can the heat units fly away in this manner when the flue is blocked with gas fumes? Much else is found in this leaflet (which will no doubt be distributed largely among householders) of a similar character; and then it winds up with the rancorous statement: "Use electricity, the only pure heating and lighting agent. Electricity will not poison or suffocate. Gives off no fumes of any kind, and its use cannot be accompanied by chemical products of combustion." Manifestly, the more virulent the leaflet, the higher is the price fixed. As we have said, these cost 67s. 6d. per 1000.

Another leaflet is picked up. This deals with "Electric Light and Safety." But there is only this mere postulation as to the safety of electricity: "Electric light *is* a safe light. It has none of the dangers of gas." Dead silence on the risks of electricity, as proved by fatal fires, and as to the hundred-and-one rules and regulations of the Institution of Electrical Engineers, the Fire Offices, and Government Departments. Not an instance of a fire is mentioned generated by electricity. But an extract is made from the "Pall Mall Gazette" in which there is the allegation, which has not been sustained by the evidence—indeed, all the evidence points to the contrary—that the fire on the wrecked Scotch express in December last was due to the gaslighting of the train, part of which was electrically lighted. Then we have preceding another extract the heading "House Cut in Two: Extraordinary Effects of a Gas Explosion," another "Gas Explosion at Workhouse," yet another "Gas Explosion: Alarming Incident at a Bulwell Factory," and so on. Not a word about the poor girls and others whose deaths have been due to fire originated electrically. The day when these circulars will have to be answered approaches—perhaps we should say is here; and their character calls for the effective answer provided by electrical experience.

The next circular in the little pile is headed "Use Electric Light, and Avoid Eye Strain." There is not much said in this; there is not much to be said. We miss quotations in it from numerous electricians, and scientists, and the electrical press showing the tremendous evil of electric metallic filament lamps upon the eyes, unless every lamp is enclosed in a diffusing or frosted globe. The time will come, and that quickly, when the information supplied in the Electricity Publicity Committee's circular will be supplemented—but probably not by them. Among the other circulars is one about "Electric Power," with the caricature of a policeman on the outside crying "Stop!!" Humorous pictures of the kind are hardly consistent with commerce; and after viewing the outside of the circular most people will—and rightly—hesitate to accept the highly embellished character given inside to electric power. Quite up to time, the circulars contain a specimen of one referring to the Coronation illuminations.

This is only one side to the activities of the Electricity Publicity Committee's work. Are there any Gas Directors, Gas Committeemen, or Gas Managers who still think that among the needs of the gas industry to-day is not a vigorous Gas Publicity Committee? If so, we regret the short-sightedness.

THE HYGIENIC ASPECTS OF GAS LIGHTING AND HEATING.

The number of the "Medical Magazine" for the current month contains an article giving the results of some experiments made at the Lewisham Infirmary last November, under the supervision of Dr. F. S. Toogood, the Medical Superintendent of the Infirmary, with the following objects: (1) To compare hygienically the relative values of the open fire and the gas-radiator as warming agents; (2) to ascertain if, and to what extent, the quality of the atmosphere of a room is affected by incandescent gas burners and lamps; and (3) to ascertain the hygienic value of the gas-fire. The determinations made were to estimate the carbonic acid present, the humidity, and the temperature. The following are the principal features of the article.

Two wards, described as the Shaftesbury and the Wilberforce, were selected for the experiments. Being identical in form, dimension, and disposition (they were situated on the second floor), they were eminently suitable for comparative trials. There were ventilating outlets in the ceiling of each ward. The Shaftesbury Ward was warmed by eight gas-heated radiators of the flueless type, each having ten radiating columns. The gas consumption was 16 cubic feet per hour for each radiator, or 128 cubic feet for the whole of them. The radiators were arranged at approximately equal distances along the longer walls of the ward. The Wilberforce Ward was warmed by two large coal-stoves arranged in the axis of the ward. These stoves had water-circulating systems attached to them. The Shaftesbury Ward was lighted by four "Nico" inverted incandescent gas-lamps, each containing three mantles. These were suspended from the ceiling in a line corresponding with the centre of the ward. Each lamp consumed 10½ cubic feet of gas per hour, and gave a light of about 300 candles. There was no artificial lighting in the Wilberforce Ward at the time of the tests. The dimensions of the wards are: Length, 91 feet; width, 23 ft 9 in.; height, 11 ft. 6 in.—giving a total capacity of about 24,800 cubic feet. Both wards were occupied by patients at the time of the experiments; the number being approximately the same in each case. Some experiments were also carried out in a sitting-room; the one chosen being that used by the Sisters. It is rectangular in form, with a bay window, the dimensions being: Length, 24 feet; width, 15 feet; height, 11 ft. 6 in. It is provided with proper, but not exceptional, means of ventilation. The room was warmed by a gas-fire having an incandescent surface 21 inches wide, and consuming 45 cubic feet of gas per hour. It was lighted by three "Nico" inverted incandescent gas-burners, each consuming 2½ cubic feet per hour, and giving a light of about 65 candles. The burners were arranged on a pendant

suspended from the centre of the ceiling. The room was occupied at the time of the experiments.

The first experiment was made on the 14th of November, to test the effect of gas lighting and heating on the atmosphere of a ward. The radiators and the gas-lamps in the Shaftesbury Ward were lighted at 10.30 a.m.; and the gas consumption per hour was as follows: Eight radiators, 128 cubic feet; four incandescent gas-lamps, 42 cubic feet—total, 170 cubic feet. There was no consumption of gas in the Wilberforce Ward, in which there were 23 patients—one less than the number in the other ward.

Name of Ward.	Time Test was Taken.	Parts CO_2 in 10,000.	
Shaftesbury (gas)	2.20 p.m.	5·5	Average 5·7, after gas had been alight for four hours.
,,	2.30 ,,	5·5	
,,	2.40 ,,	6·5	
,,	2.50 ,,	5·5	
,,	3·0 ,,	5·5	
Wilberforce (coal)	3.15 ,,	6·0	Average 5·7
,,	3.30 ,,	5·5	

The next experiment (made on the 18th of November) was to test the heating power and effect on the atmosphere of the radiators and lamps. They were started between 11.40 a.m. and 11.45 a.m. The outside temperature was then 42·5° Fahr., and in the centre of the ward 47·5° Fahr. By 3 p.m. these temperatures had increased to 45·5° and 56·5° respectively. Eight persons were in the ward between 10 a.m. and 12, and 23 between midday and 3 p.m. The tests for carbonic acid (eleven in all) ranged from 4·5 up to 6 parts per 10,000, except in two cases, where air was taken at about 2.30 p.m. at a point 6 inches from the ceiling, when the figures were 8 and 8·5 parts; showing that the heated products of combustion readily ascend above breathing level.

An experiment was made on the same day to test the effect of heating systems on the humidity of the air. The following were the results obtained:—

	Time.	Hygrometer Readings. Wet Bulb. (Deg. F.)	Dry Bulb. (Deg. F.)	Diff. (Deg. F.)	Humidity. (Per Cent.)
Shaftesbury Ward	11.40 a.m.	44	47·5	3·5	75·0
,,	12.6 p.m.	47	52·0	5·0	68·0
,,	12.15 ,,	48	53·5	5·5	67·0
,,	12.45 ,,	48	54·5	6·5	61·5
,,	1.0 ,,	49	56·0	7·0	60 0
,,	2.0 ,,	49·5	57·5	8·0	56·0
,,	2.30 ,,	49	57·0	8·0	55·5
Wilberforce Ward	4·0 ,,	47	54·5	7·5	56 0
Outside air . .	11.30 a.m.	40	42·5	2·5	77·0

The humidity was calculated upon the proportion (in grammes) of water vapour actually present to that required for complete saturation.

Experiments were made in the Sisters' room to ascertain the effect of a gas-fire with flue and gas-burners on the temperature of an atmosphere of an occupied apartment. The gas-fire and the three inverted incandescent gas-burners were lighted at 3.30 p.m. The gas consumed per hour was 45 cubic feet for the fire and 2·5 cubic feet each for the burners; making 52·5 cubic feet. There were five occupants in the room from 6.30 p.m. to 8 p.m., and two for the rest of the evening. The temperature outside was 44° Fahr.; that of the air inside, 58° Fahr. Tests were made in the centre of the room at 8 p.m. and 15 minutes later, and they showed 6 and 5·5 parts (an average of 5·75 parts) of carbonic acid per 10,000; while two other tests, made at a point 3 feet in front of the fire at 8.30 p.m. and 8.45 p.m., showed 5 parts. In another experiment, the fire and burners were lighted at 2 p.m.; the consumption of gas being as before. There were six occupants in the room from the hour named, and eight from 3.30 p.m. onwards. The air tests showed an average of 4·8 parts of carbonic acid per 10,000. In a third experiment, the gas was lighted at 9 a.m.; and there were two occupants of the room. Tests were taken at 3.45 p.m., 3.50 p.m., and 4 p.m.; and the results showed an average of 4·8 parts of carbonic acid per 10,000.

Dr. Toogood makes some interesting observations on the results of his experiments, in the course of which he says: "Experiment No. 1 [made on Nov. 14] is interesting in so far as it indicates the effect of gas heating and lighting upon the purity of the air. The Shaftesbury and Wilberforce Wards are practically identical in every respect, except that the former was warmed by gas-heated radiators and lighted by incandescent gas-lamps, whereas the latter was warmed by two large open coal-fires having water-circulating systems, and contained no artificial illumination. The effect on the purity of the air was *nil*, so far as the carbonic acid was concerned." He points out that figures giving the parts of carbonic acid per 10,000 present in the air of rooms are not conclusive evidence as to the degree of vitiation of that air, unless it is known whether the excess of this impurity over the normal is due to the combustion of purified coal gas or to the exhalation of it from lungs. He says "the CO_2 produced by the combustion of purified coal gas is a chemically harmless inactive gas, the presence of which to the extent of 20 or 30 parts per 10,000 would have no physiological effect on the inhabitants of a room. On the other hand, the CO_2 produced by respiration of animals and persons is always associated with organic compounds, the inspiration of which is extremely hurtful to the human organism, resulting in a lowered condition of general health which predisposes the subject to the attacks of all bacterial diseases. Carbonic acid is taken generally as the measure of atmospheric impurity because it is more readily measured than are the active and harmful gases by which it is accompanied when it is the product of respiration; but if its production is not so accompanied, it may be a very misleading test unless full consideration is given to this fact. This is a point that needs always to be borne in mind by those dealing with problems of hygiene; otherwise systems of lighting and heating that are not only economical and convenient, but which also assist in the ventilation of premises, may be condemned, simply because their use entails the discharge into the atmosphere of small quantities of carbonic acid and water vapour."

Resuming his observations upon the experiments, Dr. Toogood says the second confirms the first. During it the composition of the air near the ceiling was examined, and the carbonic acid found was somewhat higher than in the breathing zone. It may, he thinks, be reasonably concluded from this that not only does the carbonic acid of combustion ascend quickly beyond the breathing zone, but that in so doing it must set up a vigorous movement of the air of the room, and so augment the natural ventilation.

The data obtained in the experiment made to test the effect of heating systems on the humidity of the air are considered by Dr. Toogood to be extremely interesting, as bearing upon a rather important aspect of the problem of ventilation. The term "dryness of air" is, he points out, often misconstrued. It does not mean that a "dry atmosphere" necessarily contains less water vapour than a wet atmosphere, but that its degree of saturation—*i.e.*, the proportion of water vapour present in the air to that necessary to produce complete saturation—is less. This distinction is rather important in connection with the maintenance of any desired degree of humidity when considered in conjunction with the subject of warming. The humidity in the Shaftesbury Ward decreased with increasing temperature, owing to the fact that no special measures were taken to add water vapour to the air. The air in the Wilberforce Ward was also less humid than the outside air, for the same reason. Dr. Toogood explains that the higher humidity of the gas-heated ward was probably due to the fact that gas in burning produces about 300 grains of water vapour per cubic foot, which to some extent makes up for the increased temperature. He says it is probable that if the temperature of the Wilberforce Ward had been raised to the degree subsequently obtained in the Shaftesbury Ward—viz., about 57° Fahr.—its humidity would have been still lower than 56 per cent. He mentions, as being worthy of note, that among the patients in the Shaftesbury Ward were some suffering from bronchial complaints; but they did not experience any irritation of the bronchial passages during the experiments. He considers the experiments carried out in the Sisters' room need no special comment, as "they indicate very clearly that a properly-arranged gas-fire materially assists the ventilation of a room, and so aids in eliminating the vitiation that accrues from the presence of human beings."

Dr. Toogood says his experiments may be regarded as having proved conclusively—

1.—That, in both large and small apartments which have normal means of ventilation, gas consumed in modern incandescent burners can be used for lighting without any detriment to health; being found, in fact, to assist ventilation by the increased circulation of the air.

2.—That a gas-fire, properly constructed and fixed, not only does not vitiate the air, but is a valuable adjunct to the ventilation of the room. Its advantages in the sick-room—in respect of its reliability, avoidance of noise, freedom from dust-producing propensities, and saving of both work and anxiety—are obvious to every professional man and woman.

3.—That in large rooms, adequately ventilated, flueless gas-stoves can be used for heating without any hygienic disadvantages; the heated products of combustion (mainly CO_2 and water vapour) ascending quickly above breathing level. This method of heating—by radiation and convection from flueless gas-stoves—is economical; but proper ventilation of the buildings in which it is adopted is essential, which, of course, is also the case whatever means of heating be adopted. A ward or other public building in which gas-radiators cannot be used with advantage is improperly ventilated.

As mentioned at the outset, the full text of Dr. Toogood's interesting and valuable report is contained in the February number of the "Medical Magazine," which is published at No. 44, Bedford Row, W.C., at 1s. 2d., post free.

At the meeting of the Society of Arts to-morrow evening, Mr. J. Wertheimer, Professor of Applied Chemistry in the University of Bristol, will read a paper upon "Water Finders." The author, it may be remembered, has given considerable attention to this subject; and his paper should prove interesting.

In the "JOURNAL" last week, it was announced that Mr. James Swinburne, F.R.S., would deliver lectures on the 17th and 24th inst., to students of the Institution of Civil Engineers, on "The Uses of Chemistry in Engineering." It was subsequently found that Mr. Swinburne was unavoidably prevented from attending on the dates named; and arrangements have been made for the delivery of the lectures on the 24th and 31st of March.

We have received from the publishers, Messrs. Charles Griffin and Co., Limited, the fifth edition of the late Mr. Bryan Donkin's "Text-Book on Gas, Oil, and Air Engines." The work has been revised and extended by Professor Burstall and Mr. T. Graves Smith, M.I.Mech.E., and it contains 243 illustrations and selected tables of trials. The price of the book, which will be more fully noticed in a subsequent issue of the "JOURNAL," is 25s. net.

A NOVEL BREEZE WASHING APPARATUS.

[COMMUNICATED.]

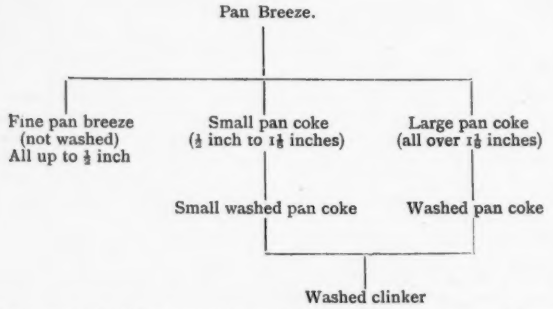
ONLY within late years has it been realized that to extract and make use of the somewhat large proportion of coke which is contained in pan breeze is a simple and profitable operation. In view of this fact, a short survey of a novel method used to separate coke and clinker will, no doubt, be of interest to the majority of gas engineers, especially when it is remembered that the marketable value of pan breeze is only about one-fifth of the value of the coke it contains.

For the past eighteen months, the writer has been connected with the working, at a London gas-works, of the most recent breeze-washing apparatus—the Blackett washer. Although the plant has scarcely been working sufficiently long to show absolutely conclusive results, yet there is no reason to be sceptical about its success, and some very useful and profitable work has been carried out with it. Before the introduction of the Blackett washer at these works, a more or less primitive means of washing the coke was in use; and as this was quite successful, it was believed that a more scientific process might be adopted to much greater advantage. It should be mentioned that not only is pan breeze treated, but also coke breeze—*i.e.*, the residue which passes through the loading forks, is subjected to washing and separated from the shale or slaty matter it contains. A ready market is found for this small coke; it is largely supplied in the district for use in blacksmiths' fires and for other purposes.

Before describing the construction and working of the Blackett washer, it will be as well to trace briefly the general principles involved in separation by washing. When two solids—the one heavy and the other light—are mixed together, a ready means of separating them is to immerse them in water, when the lighter substance will rise to the surface and the heavier sink to the bottom. This method can, of course, only be employed when one of the two substances is lighter than water. Now pan breeze consists chiefly of two substances—slag and coke; the former being comparatively heavy, whereas the latter is extremely light. The above method, therefore, forms an admirable means of bringing about separation. As can be conceived, the apparatus required may be of exceedingly simple construction; and the usual form of plant consists merely of a wooden trough, placed slightly on the slant, and down which flows a constant stream of water. The light coke, floating on the surface of the water, is carried over a weir at the lower end of the trough, and is then caught up on a grid; the heavy clinker being deposited on the bottom of the trough. The water, circulated by means of a small pump, may be used over and over again. The simplicity of this method is greatly in its favour. It has, however, its disadvantages, in that only a small quantity of material can be treated at a time, and also the labour charges absorb too large a proportion of the profits.

The two following tables form, so to speak, a "genealogical tree" of pan breeze and coke breeze, and they show at a glance the different products obtained by subjecting these two materials to washing.

TABLE I.


Pan Breeze.
Fine pan breeze (not washed) All up to ½ inch
Small pan coke (½ inch to 1⅛ inches)
Large pan coke (all over 1⅛ inches)
Small washed pan coke
Washed pan coke
Washed clinker

The method of treatment is as follows: The rough pan breeze (the large pieces of clinker having first been removed) is tipped into the boot of an elevator, and is then sorted out into three sizes by means of a rotary cylindrical screen. The screened material, caught in hoppers, is separated thus—

A—Dust, and all passing through ½-inch mesh.
B—½ inch to 1⅛ inches.
C—All over 1⅛ inches.

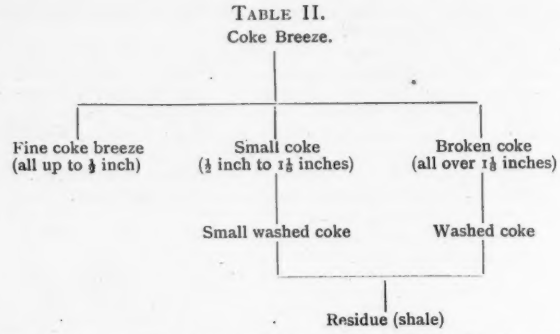
The fine material in hopper A is never washed. The material in hopper B is led to the washer by means of a trough, and is separated out into small pan coke and clinker. The material in hopper C is treated in the same way.

The coke breeze receives exactly the same treatment as the pan breeze; and in the three hoppers the following materials are obtained:

A—Fine coke breeze (up to ½ inch).
B—Small coke (½-inch to 1⅛ inches).
C—Broken coke (all over 1⅛ inches).

As in the case of pan breeze, the fine material in hopper A is not passed through the washer, but is usually sent away for use in the boiler house. The small coke, in hopper B, is washed and the shale removed. The broken coke, in hopper C, receives the same treatment. The hard residue of shale obtained is, of course, valueless, and, piled in heaps, it awaits the arrival of the next rubbish cart.

TABLE II.


Coke Breeze.
Fine coke breeze (all up to ½ inch)
Small coke (½ inch to 1⅛ inches)
Broken coke (all over 1⅛ inches)
Small washed coke
Washed coke
Residue (shale)

Although outwardly the Blackett washer appears to be somewhat massive, it is not so in reality; and its construction is unusually simple and free from complicated design. It consists essentially of a cylinder 28 feet in length, built up of mild steel plates, ⅜-inch thick, and with additional stiffening plates at intervals along its length. Inside the cylinder, extending from top to bottom, is a coil attached to the circumference and made in the form of an Archimedean screw. The cylinder is erected at a slight incline (the inlet being at the higher end); and it rotates at a speed of about nine revolutions per minute. The screw is arranged so that it works in opposition to the incline; thus, anything heavy, such as a clinker, thrown in at either end, would not, owing to gravity, fall out at the lower end, but would be taken up by the screw and thrown out at the higher end.

The Archimedean screw varies in depth from 1½ to 3 inches. It is made of ⅜-inch flat iron and fixed to the cylinder by means of brackets. To the periphery of the cylinder are attached in two places—one top and bottom—faced V-shaped rings of cast-iron; and these rest in pulleys, which have a corresponding V groove in their circumference. The four pulleys constitute the whole bearing of the cylinder, and one of them, attached to a countershaft, is sufficient to rotate the washer—the drive, of course, being purely frictional.

So much for the apparatus. The following is the *modus operandi:* The cylinder is rotated, and at the same time a stream of water is admitted at the upper end. The water, flowing over each successive weir formed by the screw, runs away at the lower end. The material to be washed passes along a trough, and is delivered about one-third the way down the cylinder. The lighter coke floats on the surface of the water, surmounts the weirs, and is finally discharged at the lower end of the cylinder. The heavy clinker, however, sinks to the bottom, and is, in turn, conveyed by the screw to the higher end of the cylinder, where it also is discharged. In this way, clinker and coke or shale and coke are separated. Perfect separation is, of course, impossible; and a small amount of light clinker is always found with the coke, and, likewise, a few pieces of heavy, sodden coke are found with the clinker.

Experiments show that very often small pieces of clinker are so light that their specific gravity is less than that of the coke. The average of a number of tests, however, show the following to be about the respective gravities:

Pan coke	sp. gr.	1·325
Clinker	,, ,,	2·075
Ordinary small coke	,, ,,	1·236
Shale	,, ,,	2·185

These figures are liable to considerable variation; and although several tests were made in each case, no two precisely similar results were obtained from the same material. With reference to the quantities of each particular material obtained, here, again, no hard-and-fast rule can be laid down; but recent experiments conducted by the writer, on weighed quantities of both pan breeze and coke breeze, showed the following results:

PAN BREEZE.

	Tons	Cwt.	Qrs.
Total amount treated	11	7	0
Amount of washed coke obtained	5	2	0
,, ,, clinker	3	10	2
,, ,, fine breeze (unwashed)	2	1	3
Total	10	14	1
Loss in weight		12	3
Amount of clinker in pan breeze washed		41 per cent.	
Amount of coke obtained from total quantity of pan breeze treated		48½ ,, ,,	

COKE BREEZE.

	Tons	Cwt.	Qrs.
Total amount treated	9	15	2
Amount of washed coke obtained	5	12	2
,, ,, shale	1	0	1
,, ,, fine breeze (unwashed)	2	15	0
Total	9	7	3
Loss in weight		7	3
Amount of shale in coke washed		15¼ per cent.	
Amount of coke obtained from total quantity of coke breeze treated		57½ ,, ,,	

In each case the loss in weight appears to be somewhat high.

It should be explained that the water, which is used over and over again, runs into settling tanks after leaving the cylinder; and in these tanks the greater part of the dirt settles out. The quantity of this dirt is considerable; and in some cases about 2 tons of it have been obtained as the result of a day's working. This amount is, however, abnormal, and was probably due to some defect in the screening plant. The water is supplied to the cylinder by a 5-inch centrifugal pump. Originally a 4-inch pump was in use; but it did not give a sufficient supply.

A certain amount of trouble was at first experienced in getting the cylinder at the correct slope for the material under treatment; but finally it was found that for both substances an inclination of 1 in 10 gave the most favourable results. Possibly better results might be obtained if a device were employed by which the slope of the cylinder could be adjusted to each particular material. At present, however, this seems more or less impracticable; and if an exceptionally good quality material is desired, it is a simple matter to employ a lad to pick over the coke as it is discharged.

From every appearance it would seem that one great drawback to the machine will be a heavy wear and tear account; for it can hardly be expected that mild steel plates will stand the grinding action of clinker for any great length of time. Moreover, when the machine is at rest, there is sure to be considerable oxidization of the wetted surfaces. This, however, is a problem which time and experience alone will solve.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to Dewsbury.

On Saturday last, the members in very large numbers joined in the annual complimentary visit to the works of the President (Mr. Fred. Scholefield), those of the Dewsbury Corporation. The Association had already visited them; and a description appeared in the "Journal" at the time (Vol. XCVI., p. 750). Still, as a personal tribute to the President, an exceptionally large attendance was recorded. The works themselves invite visiting and repay inspection, inasmuch as they were completely designed and erected on a new site by the late Mr. C. A. Craven; and, with the exception of an installation of inclined retorts and enlarged holders, they remain very much as they were originally planned. Mr. Craven's foresight has been abundantly justified, though the growth of the gas undertaking is now pointing to an extension of some parts of the plant, provision for which was made in the original plans. The exceptional railway facilities are always of interest to visitors; while the general roominess (and on Saturday the extreme breeziness) of the works is notable.

Originally a paper on "Alterations to Hydraulic Mains," by Mr. C. P. Cawthra, had figured on the programme; but so fully did the visitors give themselves to the inspection of the works, that it was crowded out and deferred to a future meeting.

Mr. G. W. Fligg, the Engineer and Manager, and Mr. Scholefield entertained the visitors at tea; and during the repast conversation flowed easily, and closed pleasantly a meeting that will long be remembered for its interest and for the geniality and freedom of friendly intercourse among the members. The hosts were warmly thanked by the members after speeches by Mr. J. H. Hill, S. W. Shepherd, and P. MacNab, which just hit off the situation, and embodied the spirit of the occasion.

German Association of Gas and Water Engineers.

It is officially announced in the "Journal für Gasbeleuchtung" of the 18th inst. that the date of the fifty-second annual general meeting of this Association has been fixed for the 26th to 30th of June next. The meeting will be held at Dresden, under the presidency of Herr H. Prenger, the Manager of the Corporation Gas, Water, and Electricity Undertakings of Cologne. It is pointed out that the International Exhibition of Hygiene is being held at Dresden this year, and visits to it will be arranged for those attending the meeting.

At the rooms of the Royal Society, Burlington House, last Thursday, a presentation was made to the Society of a portrait of Sir William Crookes, O.M., the Foreign Secretary of the Society. It has been painted by Mr. E. A. Walton, of the Royal Scottish Academy. While it was on exhibition in the Fitzwilliam Museum, Cambridge, it attracted the attention of certain scientific men, who determined to organize a subscription fund to acquire it for the Society; and about 130 of the Fellows and a number of chemists responded to the appeal. The presentation was made on behalf of the subscribers by Professor Meldola, one of the Hon. Secretaries of the fund. The President (Sir Archibald Geikie), in acknowledging the presentation on behalf of the Society, referred to the lustre which Sir William Crookes's researches had shed on British science, and on the Royal Society in particular. Sir William Crookes thanked the subscribers for the honour that had been done him in placing his portrait in the collection of the Society, and alluded to the circumstance that it was nearly fifty years since the Society had conferred its Fellowship upon him. He said he valued even above the award of the Copley Medal which the Society had made him in 1892, this token of appreciation of his scientific work by his friends; and he hoped he might yet be able to contribute a few more scientific papers to the Society.

RATING OF GAS AND WATER UNDERTAKINGS,

WITH AN OUTLINE OF GENERAL PROCEDURE OUTSIDE THE METROPOLIS.

By Arthur Valon., Assoc.M.Inst.C.E.

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I.

Liability to be rated for the relief of the poor was first imposed by an Act passed in the reign of Queen Elizabeth, and generally referred to as the "Act of Elizabeth." Provision was made for the appointment of overseers; and they were empowered to raise by taxation a sufficient sum to provide work for those who had no means to maintain themselves, for the relief of the old and infirm, and for the apprenticeship of the children of those not able to maintain them. It also provided that persons aggrieved by the assessment might appeal to quarter sessions. Not only occupiers but inhabitants were liable to be assessed, and, as a matter of fact, were assessed, on personal property. Naturally, this gave rise to a considerable amount of trouble; and the liability of personal property seems to have been very generally ignored except as regards stock-in-trade. This liability of the inhabitant was definitely removed by the Poor Rate Exemption Act, 1840, following upon the Parochial Assessments Act, 1836, which stated the basis upon which the assessment should be made in a form which was only applicable to occupiers. The Act also provided for a right of appeal to quarter sessions against the rate. The poor rate is still made under the Act of Elizabeth, except in a few cases where Local Acts are in force; but the procedure to be followed has been modified from time to time, notably by the Union Assessment Acts of 1862 and 1864.

The Parochial Assessments Act.

Rateable value is defined in the Parochial Assessments Act, 1836 (6 & 7 Will. IV., c. 96), where it is laid down that

> No rate for the relief of the poor in England and Wales shall be allowed by any justices, or be of any force, which shall not be made upon an estimate of the net annual value of the several hereditaments rated thereunto—that is to say, of the rent at which the same might reasonably be expected to let from year to year, free of all usual tenants' rates and taxes, and tithe commutation rent charge, if any, and deducting therefrom the probable average annual cost of the repairs, insurance, and other expenses, if any, necessary to maintain them in a state to command such rent.

Union Assessment Committee Act, 1862.

In the Union Assessment Committee Act, 1862 (25 & 26 Vict., c. 103), section 15, the gross estimated rental is defined as "the rent at which the hereditament might reasonably be expected to let from year to year, free of all usual tenants' rates and taxes, and tithe commutation rent charge, if any."

Valuation (Metropolis) Act, 1869.

In the Valuation (Metropolis) Act, 1869, which applies to the Metropolis only, the definitions are stated in clause 4 as follows:

> The term "gross value" means the annual rent which a tenant might reasonably be expected, taking one year with another, to pay for an hereditament, if the tenant undertook to pay all usual tenant's rates and taxes, and tithe commutation rent charge, if any, and if the landlord undertook to bear the cost of the repairs and insurance, and the other expenses, if any, necessary to maintain the hereditament in a state to command that rent.
>
> The term "rateable value" means the gross value after deducting therefrom the probable annual average cost of the repairs, insurance, and other expenses as aforesaid.

It will be seen that the principle underlying these definitions does not differ from those contained in the Parochial Assessments Act, but has the merit of being more clearly expressed. So that the gross estimated rental is, as the term implies, the gross rent payable to the landlord before the expenses, which the landlord usually has to meet, are deducted therefrom, or, more strictly, before making those deductions which are authorized by Statute, in respect of landlord's expenses; the amount remaining after such deductions have been made being the rateable value, which determines the proportion of any rate payable in respect of the particular hereditament. From these definitions it is evident that, in order to find the rateable value of any undertaking, it is first necessary to estimate the rent which a tenant would pay under the given conditions, and the amount of the deductions allowable as landlord's expenses.

Competition.

The rent obtainable for any property will primarily depend upon the relation existing between supply and demand, and in the case of property rented solely for the opportunity of deriving a monetary profit, the amount of profit which it may be possible to make will materially affect the rent obtainable; for when the opportunities for profit-making are great, the competition between prospective tenants is likely to be keen. Consequently, the rent will tend to bear a maximum proportion to the prospective profit. The effect is seen in the high rents obtainable for shops in certain districts of large towns. The supply being limited, and the opportunities of profit-making great, the rents are much higher in proportion to the actual structural cost of the premises than is the case in other less favoured parts.

Monopoly of District.

As gas and water companies enjoy a monopoly in their particular districts, the profit to be obtained from the supply of gas or water can only be enjoyed by the tenant of the one undertaking. Therefore, there is likely to be a sufficient number of prospective tenants to result in effective competition for the tenancy; and the amount of the profits will be a governing factor in the rent which can be obtained.

Inducement to Rent Undertaking.

The only inducement to a tenant to rent a trading undertaking is the expectation of making profit sufficient for his own remuneration after the rent has been paid; and unless there is a reasonable probability of the profits being more than sufficient to cover the sum which the tenant would expect, the undertaking would of necessity remain unlet.

Ownership.

Gas and water undertakings in this country are not usually held on a tenancy, but are worked by the owners themselves; and the rateable value has to be found by assuming a hypothetical tenant, and inferring the rent from the available evidence.

Profit.

The first step in arriving at a fair estimate of the rent will be to determine the profit which a prospective tenant might reasonably expect to obtain. For this purpose, it will be necessary to construct a complete revenue account, showing the receipts which may be anticipated, and the expenditure which must be incurred in working the undertaking during the year for which it is sought to determine the rent.

Basis for Estimating Future Rent.

The actual accounts showing the past working of the undertaking will be the best basis upon which to found an estimate for future rent. But although these will be important evidence, they are not necessarily conclusive; for while these accounts no doubt show accurately the profit made by the tenant in possession, this may differ materially from that which a new tenant might reasonably expect to make. It is possible that the actual profit is partly due to long experience, to exceptional ability, or to other personal factors. The knowledge of all the surrounding conditions of the undertaking possessed by a tenant who has been long in occupancy must, other things being equal, place anyone else somewhat at a disadvantage; and any profit which may be due to these causes cannot operate to increase the rent to any material extent. It is reasonable to assume that profits can only affect rent when those profits are obtainable by more than one possible tenant. A possible tenant, able to make an increased profit, would only give sufficient rent to obtain the tenancy, and naturally it would be to his advantage to make this increase as small as possible.

Valuation of Undertaking.

In making a valuation, it is the general practice to take the latest available year's accounts, and to examine carefully each item of receipts and expenditure, eliminating all those which would not be received or paid by the tenant, and making such adjustments as it might reasonably be expected would be made by a prospective tenant. It is tacitly assumed that the tenant will be prudent, and in possession of the best knowledge available as to the condition of the undertaking, the future prospects, and the probable trend of prices. But it would not seem fair to assume a prospective tenant to have any knowledge which could only be in possession of the actual tenant.

Year's Accounts to be Taken.

When an appeal takes place, it is a matter of importance to determine what accounts may be used as a basis of valuation. With regard to appeals against the rate outside the Metropolis, it would seem that the rateable value on which such rate should be calculated should be the correct rateable value at the time when the rate was made; and therefore, in estimating the rent on which the rateable value should be based, a prospective tenant could not have at his disposal any accounts not available at this date, but that all accounts then in existence could be used in evidence.

Decided Cases.

In *R. v. London, Brighton, and South-Coast Railway Company* (1851), 15 Q.B. 313, p. 367, Coleridge J., said:

> The sessions ought to avail themselves of every light that can be afforded them down to the latest period antecedent to the actual making of the rate, in order to bring it to the greatest possible accuracy. The overseers, in making a prospective rate, are to make it on the supposed prospective value ascertained by them, as well as they can, from the latest evidence in their power as to antecedent value.

Within the Metropolis, the position is somewhat different, as an appeal lies, not against a rate, but against the valuation list prior to its coming into force; and when the Assessment Committee have finally approved the list, no alteration can be made therein except on appeal to sessions from their decision. The position is somewhat similar to that in which a rent is fixed at a certain date, the period from which the rent is payable not beginning until a later date. Therefore, the only evidence which would be available on which to base an estimate would be that obtainable previous to the date at which the rent was fixed, which date, in this instance, would appear to be the date when the Assessment Committee decided the objection. It would therefore be permissible to take as the basis of valuation accounts for the latest period previous to the Assessment Committee's decision. How far accounts becoming available after this date, and before the hearing of an appeal by quarter sessions can be used, is not very clear. It would, however, seem from the decisions that such accounts might be used by way of argument to show that forecasts made at the time when the rateable value was fixed had or had not been falsified by actual events. The following are important decisions on this point:—

In *South Metropolitan Gas Company v. Greenwich Union* (1891), it was held that a valuation "based in part on events subsequent to the decision of the Assessment Committee was not admissible, but, semble, that it was open to the appellants to give evidence of facts happening after the decision of the Assessment Committee, in order to show what the hypothetical tenant might, at the date of the decision, have foreseen." (Ryde's Rating Appeals, 1891-93.)

In *Gaslight and Coke Company v. Assessment Committees of the City of London and Other Unions* (1891), the accounts were taken to June 30, 1890, which were the latest available at the time when the decision of the Assessment Committee was given, but were subsequent to the date upon which the valuation was first made. In the course of the case, the Chairman (Sir P. H. Edlin) said:

> It will be from the 1st of July, 1889, to the 30th of June, 1890. Those two half years are, in our judgment, the proper period during which accounts might have been, should have been, and would properly have been, considered by the Assessment Committee.

During the hearing in the same year of the appeal of *London and India Docks Joint Committee v. Stepney and Poplar Unions*, when it was desired to base the valuation upon accounts to June, 1890, the decision in the Gaslight and Coke Company's case being quoted, Sir P. H. Edlin said:

> For convenience sake we made that order in those appeals; but it was clearly understood that we did not concede that as of right to the parties asking for it. It was done for convenience, because the parties were threatened with an appeal the next year and a supplemental list unless the accounts were so taken. But *non constat* that the same reasons exist in the present case.

(Ryde's Rating Appeals, 1891-93, p. 169.)

In *South Metropolitan Gas Company v. Greenwich and Other Unions* (1897), the hearing of the objection by the Assessment Committee took place after a half-yearly period, for which the accounts were made up, had been completed, but before these accounts were published. The accounts were, however, published before the list was finally approved. What accounts were entitled to be used was argued at length; and the following decision was given by the Chairman:

> The question we have to find is the amount which the property would reasonably be expected to let at year to year, from the 6th of April, 1896; and we are asked by the respondents to confine the evidence on which we may arrive at our conclusion to a period of twelve months ending on the 31st of December, 1894. The appellants contend that we ought to receive evidence of facts and accounts up to the 30th of June, 1895. I do not find any Statute or decision which limits the particular period to which, and to which alone, we are bound to confine such evidence, and it seems almost absurd, in estimating the sum at which the property would let at from the 6th of April, 1896, onwards, to be limited to figures applicable entirely to so remote a period as 1894. How far the evidence adduced as to the first six months of 1895 may weigh with us I cannot yet say; but we find that we are bound to receive and consider it, and that we conform with the Act in doing so.

In the South Metropolitan Gas Company's appeal (1907), before Mr. Wallace, K.C., the Company asked to take the accounts down to June, 1905, while the Greenwich Union and others, based their valuations on an average of five years, and also on the year 1904. Discussing the correct year to take, the Chairman said:

> I am afraid you are both entitled to give evidence on your own figures. If you cannot agree as to the best way of doing it, you are both entitled to inform the Court by what means you have arrived at your figures.

And in the Judgment, the Chairman also said:

> We are trying to find out what the hypothetical tenant would give. To find that out, we have considered it from the point of view of an average of five years; from the point of view of the last year 1904, and from the point of view as given by the Company including the last half year.

Estimate of Rent.

When an undertaking is rented solely on account of the profit which may be derived from the occupation, it is, of course, necessary first to estimate the probable amount of the profits before it is possible to decide what rent a tenant could afford to pay. After this has been done as accurately as may be, with the aid of all the available information, it is next necessary to determine what proportion of the profit the tenant will himself require as a return for carrying on the business—this being the only reason of his renting the undertaking. The balance of the profit will then represent the rent payable to the landlord, from which must be deducted the landlord's expenses as directed by Statute, the remainder being the rateable value. As the rent to be found is the rent for the future, the estimate made of the profits must be an estimate looking forward; and in considering the accounts showing the working during a period which is past, such modifications must be made as a prudent person would make having regard to all the circumstances, and giving full consideration to the alterations which may take place during the period for which the rent is to be fixed.

The various heads under which the receipts and expenditure of a gas undertaking are placed will now be considered in detail, showing what adjustments may have to be made, and the method it is the general practice to pursue in the drawing up of a complete valuation. A sample valuation is given in Appendix A.

APPENDIX "A."

THE ..... GAS COMPANY.

VALUATION *of the Company's undertaking for Rating Purposes, based on the Accounts for the Year ending* .....

GROSS RECEIPTS.

By Sale of gas, private rental		£36,000
,, public rental		5,000
Rental of meters		1,500
Rental of stoves		500
Rental of fittings in prepayment consumers' houses		480
Residual products—		
Coke	£7,920	
Breeze	100	
Tar	1,590	
Sulphate of ammonia	1,820	
		11,430
Profit on sale of fittings		290
Total		£55,200
(Transfer fees £8 excluded.)		
Less—		
Bad debts		60
Total gross receipts		£55,140

TENANT'S WORKING EXPENSES.

Coal and oil, including carriage, &c.	£25,640	
Purification	385	
Salaries of engineer and officers at works, wages and gratuities at works, &c.	5,250	
(Repair and maintenance of works £5280, and repair and renewal of mains and service-pipes £1070, excluded. See "Tenant's Maintenance" below and "Landlord's Statutables.")		
Repairing, renewing, and refixing meters	730	
,, ,, ,, stoves	710	
,, ,, prepayment fittings	590	
Public lamps, lighting, and repairing	845	
(Rents, rates, and taxes £1685 excluded.)		
Directors' allowances, salaries of Secretary, Accountant, and clerks	1,330	
Collectors' salaries, stationery and printing, general establishment charges, Auditors	890	
Pensions and superannuations	360	
Law charges	30	
(Depreciation fund for works on leasehold land £8 excluded.)		
Tenant's maintenance, in this case taken at one-sixth of the total repairs. (See "Landlord's Statutables.")	900	
		37,660
Net receipts		£17,480

TENANT'S CAPITAL.

4½ months' working expenses (3-8ths of £37,660)		£14,122	
Less—			
4½ months' cash residual receipts (3-8ths of £2286)	£857		
3 months' credit residual receipts (1-4th of £9144)	2286		
3½ months' prepayment receipts (7-24ths of £3950)	1152		
4½ months' supplemental rental	220		
Consumers' deposits	4500		
		9,015	
		£5,107	
Add—			
3 months' rates		433	
Stock of coal, six weeks' additional (6-52nds of £25,640)		2,958	
Stock of residuals		587	
Sundry stores and tools, office furniture, &c.		2,900	
Meters, as per valuation		10,425	
Stoves, as per valuation		5,095	
Prepayment consumers' fittings		2,995	
Cash at bank		500	
Total		£31,000	
TENANT'S SHARE—			
(Say) 17½ per cent. on £31,000	£5425		
Add interest on consumers' deposits	225		
			5,650
Gross estimated rental *plus* rates			£11,830

STATUTABLE DEDUCTIONS.

Repair and maintenance of works and plant and Repair, maintenance, and renewal of mains and service-pipes (five years' average)	£5400	
Less—		
Tenant's portion, in this case taken at one-sixth	900	
	£4500	
Add—		
Insurance	35	
		4,535
Rateable value of whole undertaking, *plus* rates		£7,295

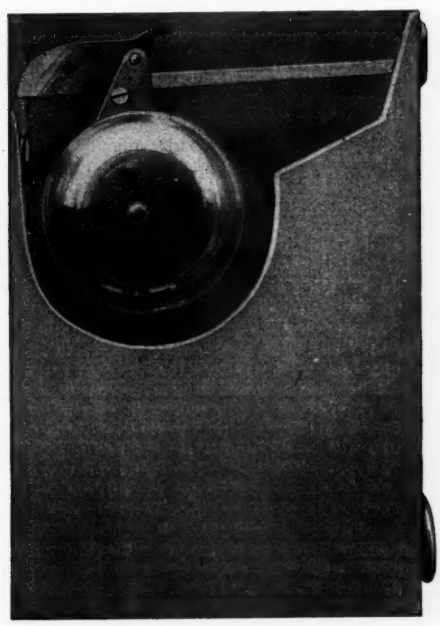
APPORTIONMENT.

Rateable value of whole undertaking, *plus* rates	£7,295
Less—	
Rateable value of works and indirectly productive mains, *plus* rates	3,995
Rateable value of productive mains, *plus* rates	£3,300
Equal to 7·59 per cent. of the total gas, meter, stove, and fittings rental of £43,480.	

Parish.	Rentals in Parish.	Rateable Value of Mains *plus* Rates in Parish (7·59 per cent. of Rentals).	Less Rates.		Rateable Value in Parish.
			At in £.	Amount.	
	£	£	s. d.	£	£
A	6,940	527	4 0	88	439
B	12,140	921	5 0	184	737
C	24,400	1852	6 8	463	1389
	43,480	3300		735	2565
Add works, &c., in Parish C, *plus* rates		3995	6 8	999	2996
		7295		1734	5561

ALARUM OR STRONG BOX FOR COIN-METERS.

THERE always has been, and we have no doubt there always will be, a section of the community who will not recognize the distinction between *meum et tuum*. The law and moral suasion are not strong enough to bring about any universal correction of the violation of the principle and of individual rights. The law punishes, but the law does not (excepting maybe in particular cases of the punished) act as a universal deterrent. If it did, then we should be relieved of the individual obligation to do something in assisting the law by the provision of reasonable protection against malfeasance. It is, for example, questionable whether all possible is done in the way of preventing the destruction and expense occasioned by the stealing of cash, and to block the opportunity offered to turpitude, and so assist the law, in connection with the popular prepayment meter system of gas supply. We hear half year by half year of the cash-boxes of such coin-meters being, in some districts, forced open and rifled, and the meters severely damaged in the process, by the thousands or hundreds; and few indeed are the gas undertakings that altogether escape this experience in certain quarters of their areas. Apart from the loss of money and the expense involved, this sort of thing throws additional responsibility upon the police; and well may the magistrates bewail the apparent impotence of the law in putting an end once and for all to this troublesome and destructive form of robbery. The strong coin-box has been presented as a solution of the difficulty. There are some gas officials whose experience enables them to assert that, under their conditions, the strong-box has proved a friend and a preventive. Experience, however, differs. There are others who have found that the strong box is a temptation to the perpetration of greater damage; and the thief when he comes across the extra resistance rips the strong box from the meter, and appropriates the whole lot, if he cannot readily gain entry to the coin-container after removing it from its natural situation.



Heading and Willis's Patent Alarm Fitting for Prepayment Meter Coin-Boxes.

Messrs. H. J. Heading and T. Willis, members of the staff of the South Suburban Gas Company, Lower Sydenham, have, from the respective positions they occupy, realized the difficulties and the objections; and they therefore set to work to devise an altogether

new form of protection, which should not be visible, and which should be cheap of application in the case of new prepayment gas-meters, and of incorporation in older ones when brought in for purposes of repair. They have devised and patented a very ingenious arrangement, which, on the slightest provocation, tells to all within earshot of someone tampering with the meter for the purpose of possessing something that does not belong to him or her. It will also inform the residents of the house when the collector of the gas undertaking is engaged in removing the accumulations of the money-box. There has been a trial of the invention in a part of the district of the South Suburban Gas Company, where there has been a fairly bad experience of coin-box depredations. The common thief has already gained knowledge of the fact that there are among the meters in the particular neighbourhood (without external sign) a number of these warning contrivances, and, for fear of being caught in the trap they provide, he has come to the conclusion that in that area coin-meter plundering must be classified among the "dangerous occupations."

A sample of the invention has been submitted to us for examination and trial. The photographic illustration shows the nature of the invention. There is an alarum bell screwed on to the inside of the back of the money-box; and from this fitting there is a projection carrying a pawl, and a long arm or lever extending practically the full width of the money-box. On the underside of the top of the box, a catch-plate is soldered. We need not describe the whole of the details for the purpose of explaining the action and the effects. When the interior coin-box so fitted is pushed home in its outer casing, it is self-setting—the pawl engaging with the top catch-plate. When this is done, it is absolutely impossible for anyone to withdraw the coin-box without ringing the bell. As a matter of fact, directly an unauthorized person commences to open the drawer, the bell starts ringing, and it will continue to do so until the spring is exhausted. When an authorized person attempts to draw out the box, the bell will also start ringing. He has then to insert at the top a key to depress the arm and release the pawl from the top catch-plate; and then, on completely withdrawing the box, the ringing of the bell can be readily stopped. The arrangement does not impose any appreciable additional duty upon the collector; and the gong has only to be turned at long intervals (say, once in three months) to wind up the spring.

It is an effective form of protection for the purpose. It warns the tenants of a house, or the neighbours, or passers-by of either occupied or empty houses when meters are being tampered with. There is protection for the householder in a meter that will not be opened without announcing the fact that the operation has commenced or been attempted; and some slot-meter consumers have recognized this, for the South Suburban Company have already had applications from some of them for the "bell" form of meter. They like the sense of security that the arrangement gives. They have probably heard of someone attempting to force open a gas-meter at a neighbour's, and of the ringing of the bell causing such consternation that the thief decamped before obtaining possession of the money. This is real protection in a class of houses where front doors are often left open, or the latches are movable from the outside by a piece of string passed through a hole drilled in the door or through the letter-box opening. It is right that the owners of these meters should give the occupiers the feeling of security when it can be done at such a reasonable rate, by such simple means, and without any visible suggestion that such means exist. In their own interests, too, coin-meter owners will consider the value to them of this form of protection. Cheaply purchased prevention is better than dearly purchased repair, and the annoyance of the frequency of this particular trouble. As a start, meters with the patent alarum fitment could be placed indiscriminately in neighbourhoods that are badly affected; and it is pretty certain that some wholesome effect would soon be noticed.

As we have said, there is not the slightest reason why the attachment should not be applied to existing coin meters when brought in for repair. It is understood that the mechanism only means an additional cost of about 2s. 6d. per meter; so that, if it acts as a deterrent, the extra payment will be a good investment. As to maintenance, there does not appear to be anything to get out of order, excepting perhaps the breaking of the spring through a collector inadvertently over-winding it. In such a rare event, spring renewal only means a cost of possibly two or three pence. Thus the question of repair is practically a negligible quantity.

Scottish Junior Gas Association.—The annual joint visit of the Eastern and Western District Divisions of the Association will take place next Saturday, when the members will have an excursion to Airdrie, and, by permission of the Corporation, inspect the gas-works, which are under the supervision of Mr. David Vass. The visitors will be entertained at tea by the Corporation.

Manchester District Institution of Gas Engineers.—The forty-first annual meeting of the Institution will be held at the Grand Hotel, Manchester, on Saturday next. The Incoming President (Mr. Robert Watson, of Doncaster) will deliver his Inaugural Address; and there will be a paper by Mr. E. H. Hudson, of Normanton, entitled "Methods of Increasing the Output—Old and New Ideas." The *agenda* also includes reports of the Commercial Sections and the report of the Committee on the Gas-Fitters' Education Scheme. By permission of the Manchester Corporation Gas Committee and Mr. J. G. Newbigging, the members will visit the Droylsden Gas-Works, to inspect the Glover-West installation of vertical retorts.

WATER PROVISIONAL ORDERS FOR 1911.

In the two preceding issues of the "Journal," the Bills relating to the supply of water have been dealt with. It now only remains to notice the applications for Provisional Orders.

The Blandford Water Company, Limited, apply for authority to construct additional works, extend their limits of supply, and raise more capital. The new works consist of a conduit or line of pipes commencing at the reservoir authorized by the Company's Provisional Order of 1894, and terminating in the road leading from Blandford to Salisbury. It is to be completed within the time, and subject to the conditions, prescribed by section 11 of the Gas and Water Works Facilities Act, 1870. Confirmation is sought for the construction of an extension of the existing reservoir in the parish of Langton-Long-Blandford, in the county of Dorset. The enlarged area of the Company will include several parishes in the rural district of Blandford. The Company require additional capital not exceeding the nominal amount of £5000; but the whole capital is not to be more than £15,000, unless the Company obtain authority to raise it. In addition to the £2000 which the Company are entitled to borrow under the Order of 1894, they ask permission to raise £1000, at not more than 5 per cent. interest, except with the sanction of the Board of Trade. [*Parliamentary Agents: Messrs. Rees and Freres.*]

The Dundee Water Commissioners are applying to the Secretary for Scotland, under the Private Legislation Procedure (Scotland) Act, 1899, for authority to alter and enlarge their Lintrathen reservoir and the works connected therewith. In addition to the reservoir works, it is proposed to carry out a number of diversions of public roads. The enlarged reservoir is to be enclosed by proper and sufficient wire fences and gates, to be erected and maintained by the Commissioners. Ten years are required for the completion of the works specified. The Commissioners want power to raise additional money to an amount not exceeding £50,000, and such further sums as the Secretary for Scotland sanctions. [*Parliamentary Agents: Messrs. Robertson and Co.*]

The parties who are carrying on the supply of water to Guisborough, in the North Riding of the county of York, under Provisional Orders granted in 1871 and 1880, are applying for authority to raise additional capital to the amount of £6000; but, unless permission is obtained at some future time, the whole capital is not to exceed £23,000, restricted to 7 per cent. dividend. The borrowing powers of the undertakers are limited to one-fourth of the paid-up capital; and the amount raised is not to carry a higher rate of interest than 5 per cent. per annum without the consent of the Board of Trade. The rates for the supply of water for domestic purposes are 8s. 8d. per annum for houses up to £5 gross estimated rental; and varying rates per cent. when it is above this figure. Water-closets beyond the first and baths are to be extras; and meter supplies are to be at the rate of 1s. 9d. per 1000 gallons. The undertakers require authority to make regulations to prevent the waste and the misuse of water, &c. [*Parliamentary Agents: Messrs. Martin and Co.*]

The Order applied for by the North Pembrokeshire Water and Gas Company is mainly to obtain authority to raise the unissued capital by means of preference shares. The provisions relating to the supply of gas have been already noticed [see *ante*, p. 295]. Those bearing upon the supply of water deal with the detection of waste, enable the Company to require cisterns to be provided, and enforce the provisions of the Rivers Pollution Prevention Acts, 1876 and 1893, or of the Public Health Act, 1875, to prevent the fouling of streams. The preference shares are to be of £1 nominal value, and to carry interest not exceeding 5 per cent. per annum. [*Parliamentary Agents: Messrs. Baker and Co.*]

The West Gloucestershire Water Company seek authority to take a supply of water in bulk from the Clutton Rural District Council, at such point or points within or at the boundary of the limits of supply, on such terms and conditions, and for such periods as may be agreed upon. Permission is required to apply the Company's existing capital to the above-mentioned purpose. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

Obituary.

Mr. James M'Kelvie Paterson, Gas Manager at Langholm, died in Edinburgh, whither he had gone for medical treatment, on the 11th inst., at the age of 54.

Mr. H. S. Charlesworth, the Manager of the Seaton Gas-Works, died somewhat suddenly last Wednesday. Deceased, who was only thirty-nine years of age, had not been well for some time, but remained at his post up to about a fortnight ago, when an attack of influenza caused a nervous breakdown. It was hoped that he was progressing favourably; but the illness took a sudden turn for the worse. He leaves a widow and one child. At the annual meeting of the Gas Company on Thursday, sympathetic reference was made to the deceased, who had held the position of Manager for five years. He was very popular in the town. In early life, Mr. Charlesworth was employed at the New Mills (Huddersfield) Gas-Works, under Mr. T. Settle. He displayed special aptitude for gas manufacture, and was appointed leading stoker at Chertsey. From there he went as retort-house foreman to Hexham; and subsequently obtained the appointment at Seaton. He was a good example of a man rising rapidly by his individual efforts.

THE INVENTION, DEVELOPMENT, AND PRESENT POSITION OF THE DESSAU VERTICAL RETORT.

[COMMUNICATED.]

III.

THE second article of this series [*ante*, p. 292] served to bring together the more significant of the results obtained in the experimental settings of vertical retorts at the Dessau and Mariendorf Gas-Works, and to bring the history of the progress of the Dessau system of vertical retort-settings up to the close of the year 1906. It was shown that the experimental settings had given results which constituted a distinct advance on what was at that date being achieved with horizontal or inclined retorts carbonizing the same description of coal. Also that these results and the general working of the new settings had impressed a considerable number of distinguished Continental gas engineers so favourably that by the end of that year installations were completed or in course of erection comprising in all between 900 and 1000 retorts.

PROGRESS IN 1907.

The following year (1907) did not witness the publication of any exhaustive reports on the practical working of the Dessau system. The new installations just referred to were being erected; and though some of the largest came into operation halfway through the year, it was not until they had been in continuous use for a longer period that the results of their working were disclosed. Apparently it was deemed best to withhold further particulars until the durability of the settings and the results of prolonged working in everyday conditions had been proved and ascertained. Consequently, in regard to the year 1907, only a few observations will be made in this article.

It was reported in February that the Potsdam and Barcelona installations had commenced work; while an installation of three settings had been ordered for the Ludwigshafen Gas-Works. In June of the same year, there was considerable discussion on new systems of carbonization at the meeting of the German Association of Gas and Water Engineers at Mannheim; but in regard to the Dessau system, it may be said that the information given by Mr. Edward Körting, of Berlin, and by Herr Prenger, of Cologne, was only sufficient to whet the appetite for more. Mr. Körting dealt mainly with the type of retort-house most suitable for the accommodation of the new settings; and Herr Prenger could only report that the first half of the large installation of 240 retorts at the Cologne Gas-Works had been brought into operation about ten days before the meeting of the German Association. A number of gas engineers, including a special representative of the "JOURNAL," at this time visited the Cologne Gas-Works,* and were very favourably impressed with the ease of working, cleanliness, and general efficiency of the new vertical retort-settings. Judgment necessarily had to be suspended as to their durability, and even as to the make of gas obtainable per ton of coal in regular working. In the course of the discussion at the Mannheim meeting, however, Mr. Körting stated that at Oberspree a nine-days' trial of Westphalian coal had given an average make of gas of 13,277 cubic feet per ton. This make had been attained with steaming; but the gross calorific power of the gas remained as high as 592 B.Th.U. per cubic foot. The average yield of tar over a longer period was 5 per cent. by weight of the coal carbonized, and the yield of ammonia was 0·36 per cent. by weight (real ammonia), which is equivalent to a yield of 31·32 lbs. of sulphate per ton of coal carbonized.

The only other items of present interest in 1907 were the publication in August of a contribution by Dr. J. Bueb on the relative merits of vertical retorts and large carbonizing ovens,† and the announcement in December that the Continental Union Gas Company had decided to instal eight settings of ten vertical retorts, 4 metres in length, at their Genoa works.‡ Dr. Bueb showed that superheating of the gas must occur to a larger extent in ovens, in which there was an appreciable free space at a high temperature, than in Dessau vertical retorts, and expressed the view that no real economy of labour would result from the employment of large ovens in place of vertical retorts. The decision of the Continental Union Gas Company to adopt Dessau verticals had been arrived at after special investigation made on their behalf at the Dessau and Mariendorf works. Briefly, it was found that in the 4-metre vertical retorts Boldon coal gave without steaming 3·2 per cent. more gas than in horizontal retorts, while the illuminating power of the gas was slightly higher when tested according to the French method. Subsequently, however, Mr. Körting published other figures relating to the same investigation.§ They showed that Boldon coal without steaming gave a make of 11,513 cubic feet per ton. The illuminating power of this gas in the No. 1 "London" argand burner was 18·1 candles, and it certainly would not be less in the No. 2 "Metropolitan" burner; while the gross calorific power of the gas was 626 B.Th.U. per cubic foot. Similarly, Leverson's Wallsend coal, carbonized without steaming, gave a make of 11,480 cubic feet per ton, of gas testing 16·8 candles in the No. 1 "London" argand burner, and having a calorific power of 613 B.Th.U. gross per cubic foot. The same coal, with steaming, afforded a make of 12,540 cubic feet per ton with a gross calorific power of 575 B.Th.U. per cubic foot and an illuminating power in the No. 1 burner of 14·8 candles, which may be taken as equivalent to at least 16 candles in the No. 2 "Metropolitan" argand burner. As already stated, one result of these investigations was that the Continental Union Gas Company decided to adopt Dessau vertical retorts at their Genoa works.

As to the general progress made in the year 1907, it was announced early in 1908 that installations had actually been in use for some time at sixteen different gas-works; the number of retorts in these installations aggregating 1138. Moreover, installations were also under construction at eleven works, making the total number of retorts in use or in course of erection 1880.

ECONOMY EFFECTED BY VERTICAL RETORTS IN BERLIN.

An article by Mr. Körting in January, 1908,* dealt very exhaustively with the comparative merits of Dessau vertical retort settings and other carbonizing systems, especially settings of inclined retorts. The difficult questions of the cost of labour and of the wear and tear of the different systems were discussed. Briefly, Mr. Körting stated that in present Berlin conditions the producer-gas fired setting of horizontal retorts with hydraulic stoking machinery effected a saving of 3¼d. per 1000 cubic feet of gas made over direct-fired settings with manual stoking. Moreover, inclined retort-settings effected a further economy of 1½d. per 1000 cubic feet; while the Dessau vertical retorts achieved a saving over inclined retorts of 3d. per 1000 cubic feet of gas made. These figures related to the total net cost of gas, including wages, purification, allowance for wear and tear, and deduction of the value of the bye-products obtained. The detailed figures from which this final conclusion was arrived at were stated in Mr. Körting's article. More especially interesting, however, were figures quoted by Mr. Körting for the average results obtained in continuous working of the vertical retort-settings at Dessau during the month of October, 1907. The coal carbonized in this time was made up of 33·1 per cent. of Westphalian and the balance of Leverson Wallsend and New Leverson. Mr. Körting pointed out, however, that all these coals were quite second rate.

The make of gas per ton of coal averaged 11,292 cubic feet; while the illuminating power was 17·7 candles in the No. 2 "Metropolitan" argand burner. The gross calorific power of the gas averaged 588 B.Th.U. per cubic foot. These results were obtained with retorts 4 metres in length; but during the same month, the 5-metre retorts at the Oberspree works gave a make of 13,478 cubic feet of gas per ton—the illuminating power being, however, only 10·8 candles in the No. 2 "Metropolitan" argand burner, while the corrected gross calorific power was 538 B.Th.U. These figures show that while the longer retorts were favourable to the production of a high make of gas of sufficient calorific power, they involved a large reduction in illuminating power. This is a point to which further reference will be made later. In the course of his article, Mr. Körting pointed out that the drawbacks attendant upon the employment of high heats in horizontal and inclined retorts disappear in the Dessau system of verticals, notwithstanding the high heats employed. There was with the vertical retorts, he said, scarcely any formation of pitch, and no naphthalene. The quality and quantity of the tar were improved; while there was more ammonia in the gas, and the amount of bisulphide of carbon was reduced by more than 50 per cent. The coke was harder and contained less breeze.

SULPHUR IN VERTICAL-RETORT GAS.

The foregoing reference by Mr. Körting to the small amount of bisulphide of carbon in vertical-retort gas directs attention to an advantage of the Dessau system of carbonization of which mention has not previously been made in this series of articles. Almost immediately after his announcement that the amount of bisulphide of carbon was over 50 per cent. lower in the gas from vertical retorts than in that from horizontal and inclined retorts, a report was published of the results of investigations, made in the laboratories of the Imperial Continental Gas Association and the German Continental Gas Company, with reference to the relative proportions of bisulphide of carbon in gas from the same coal when carbonized in the different descriptions of retorts.† At the Oberspree works at Berlin, it was found that the sulphur in the gas, when Lambton (Durham) coal was carbonized in the 5-metre vertical retorts, amounted to only 12·18 grains per 100 cubic feet; while the average amount (for a number of days on which the coal carbonized in these retorts was a mixture of English, Westphalian, and Silesian) was only 13·30 grains per 100 cubic feet. On the other hand, the amount of sulphur in the gas from the inclined retorts at another works in Berlin, where 71 per cent. of the coal carbonized was English, averaged 28 grains per 100 cubic feet.

The carbonization of a mixture of varying proportions of English and Westphalian coal at Dessau in horizontal retorts gave gas containing on the average nearly 46 grains of sulphur per 100 cubic feet; whereas the carbonization of similar coal in vertical retorts at the same works resulted in the gas containing on the average only 21·6 grains of sulphur per 100 cubic feet. A comparison of results at Dessau, on days when English coal only was carbonized, showed an average of 42·25 grains of sulphur per 100 cubic feet for the gas made in horizontal retorts and of 21·74 grains for that made in the vertical retorts. In May, 1908,

* See "JOURNAL," Vol. XCVIII., p. 1000. † *Ibid.*, Vol. XCIX., p. 563. ‡ *Ibid.*, Vol. C., p. 695. § *Ibid.*, Vol. C., p. 765.

* See "JOURNAL," Vol. CI., p. 93. † *Ibid.*, Vol. CI., p. 343.

Dr. H. G. Colman and Mr. A. E. Broadberry also found only 21·7 grains of sulphur per 100 cubic feet in the gas made in the vertical settings at the Dessau Gas-Works from New Pelton coal.* There is no doubt from these figures that the introduction of the Dessau system of carbonization on a gas-works will result in the reduction of the amount of sulphur in the gas (after purification with oxide of iron only) to about half that which occurs in gas produced from the same coal in horizontal or inclined retorts.

Impressions of an English Gas Engineer.

Since so much of the information hitherto utilized in these articles has been derived from Continental gas engineers, it may be useful to quote briefly the impressions recorded by so experienced an English gas engineer as Mr. Charles Hunt of the working of the installations of vertical retorts at the Oberspree and Mariendorf works in Berlin, and at the Dessau, Cologne, and Dusseldorf Gas-Works, which he visited early in the year 1908.† The reduction in labour required to work the vertical retorts evidently arrested his attention more than other features of the system. At Oberspree, one man did both the charging and discharging of the four settings of twelve 5-metre vertical retorts. At Mariendorf, two men were employed on seven similar settings; but they had plenty of spare time. At Cologne, the same quantity of gas was made by 11 men with vertical retorts as by 30 men with inclined retorts, and 60 men with horizontal retorts without machinery. At Dusseldorf, there was a reduction from six to two men for the same make of gas. Mr. Hunt remarked that such figures indicated that almost, if not quite, the minimum of labour cost had been reached; while the ease with which the various operations were conducted and the comparative absence of discomfort were very marked. He saw no signs of retorts which had been in use for twelve months getting out of shape or being otherwise the worse for wear to any unusual extent.

Working Results from Cologne.

A paper was read in February, 1908, by Herr Prenger,‡ the Engineer and Manager of the Cologne Gas-Works, on the working of the large installation at that works of 240 vertical retorts which had then been in continuous operation for over six months. Ruhr or Westphalian coal had been carbonized in eleven-hour charges, with steaming during the last two hours. The labour required for the whole installation of 240 retorts was 22 men per 24 hours, including the charging and clinkering of the producers, cleansing of pipes and the retort-house, and the working of the coke conveyors and elevators. The daily make of gas per man employed worked out at about 154,000 cubic feet, as compared with a make of 66,400 cubic feet for inclined retorts, and 10,100 cubic feet for horizontal retorts on the same works. For a time exact figures as to the working of the whole installation were not available, because the gas made had been mixed with that from the horizontal retorts on the works; but later the latter had been put out of action, and it was found that the total average daily output of the installation was 3,426,000 cubic feet of gas, which works out to 142,750 cubic feet per setting per diem, and 13,133 cubic feet per ton of coal carbonized. The gross calorific power of the gas averaged 536 B.Th.U. per cubic foot.

Trials Conducted by the Carlsruhe Experimental Works.

In May, 1908, the Experimental and Instructional Works of the German Association of Gas and Water Engineers, which are established at Carlsruhe under the directorship of Professor H. Bunte, undertook a series of efficiency trials on the vertical retort installations at the Mariendorf works in Berlin and the Schlieren works of the Corporation of Zürich. The results of these trials were laid almost simultaneously before the Annual Meetings of the Institution of Gas Engineers in London and the German Association of Gas and Water Engineers in Berlin. The figures were presented to the London meeting by Mr. A. F. P. Hayman,* of Berlin, and by a Committee consisting of Dr. H. G. Colman and Mr. A. E. Broadberry.† These figures, however, were unrevised; and those here quoted are therefore taken from the report presented by Professor H. Bunte to the Berlin meeting.‡ The trials at Mariendorf were made on a bench of seven settings, each containing twelve 5-metre vertical retorts. They extended over some nine days, on four days of which the retorts were worked with steaming for 2 hours 20 minutes out of the 12 hours taken for working off the charge. In the remaining five days no steam was used, and the charge was worked off in 10½ hours. The coal carbonized during the trials was a mixture of various Silesian coals. At Zürich, the trials extended over some five days, and were made on an installation of two benches each containing five beds of ten 4-metre vertical retorts. On three of the days steam was introduced for the last 1½ hours of the period of 10 hours 40 minutes allowed for working off the charge. On the remaining two days no steam was used, and the charge was worked off in 10 hours. The weights of coal and the yields of products and the fuel consumption, &c., were determined with the greatest care; and as the trials were carried out by an independent authority and the results certified by it, they are quoted here, notwithstanding the fact that English coal was not used. About the same time also Dr. Colman and Mr. A. E. Broadberry carried out, on behalf of the Carbonization Committee of the Institution of Gas Engineers, a three days' test of the vertical retorts at the Dessau Gas-Works, using unscreened New Pelton coal. On the first and third days of the test, the charge was worked off in 10 hours without steaming; but on the second day steam was admitted during the last hour. The results obtained are placed in Table III. alongside those of the trials of the Mariendorf and Zürich settings made by the German Association Experimental Works.

In regard to these trials, the results obtained from New Pelton coal with steaming may be disregarded, because the quantity of steam decomposed was evidently too small to effect any substantial increase in the volume of gas or any appreciable change in its quality, as is clear from the fact that the calorific power differed by only 8 B.Th.U. in the trials made with and without steaming. The make of 11,259 cubic feet per ton of New Pelton coal may not be considered exceptionally good; but it must be borne in mind that the coal had made a long journey by sea and land from England to Dessau, and had suffered accordingly in its gas-making properties. In regard to the Mariendorf and Zürich trials, the most interesting fact is that a make of over 13,800 cubic feet per ton of coal was obtainable with steaming, and that the calorific power of the gas produced was approximately equal to the nominal standard of calorific power named in the Gaslight and Coke Company's Act of 1909, and is actually well above the mean calorific power of the gas now supplied by the Company (*ante*, p. 290),

There is fair agreement in the fuel consumption per 1000 cubic feet of gas made with steaming; and the mean of 23·7 lbs. of coke per 1000 cubic feet is not at all unsatisfactory. In regard to the other results, Dr. Colman and Mr. Broadberry reported that the coke produced in the Dessau retorts was of a quality nearly equal to that of an ordinary coke-oven, and that in the charging and discharging there was an economy of labour as compared with other systems. Another important fact pointed out by Dr. Colman and Mr. Broadberry must not be overlooked. The volume of gas obtained from the coal was shown not to have been swelled by producer or waste gas drawn in from the setting. The amount of nitrogen actually found in the gas was only 2·1 to 3·7 per cent.—exceptionally low as compared with gas made in other retorts.

General Observations.

The information collected in this article refers partly to trial

* See "Journal," Vol. CII., p. 809. † *Ibid.*, Vol. CI., p. 499. ‡ *Ibid.*, Vol. CII., p. 562.

* See "Journal," Vol. CII., p. 797. † *Ibid.*, Vol. CII., pp. 807, 813. ‡ *Ibid.*, Vol. CII., p. 845; and Vol. CIV., p. 256.

Table III.—*Results of Efficiency Trials in May*, 1908.

Gas-Works / Description of Coal used / Length of Retort	Dessau. New Pelton. 4 Metre.		Mariendorf. Silesian. 5 Metre.		Zürich. Saar. 4 Metre.	
	With Steaming.	Without Steaming.	With Steaming.	Without Steaming.	With Steaming.	Without Steaming.
Date of trial, 1908	May 23-24	May 21-23, 24-25	May 18-22	May 22-27	May 18-21	May 21-24
Time of working-off charge, hours	10	10	12	10½	10⅝	10
,, ,, steaming, hours	1	—	2½	—	1½	—
Average weight of charge per retort, lbs.	1062	1062	1281	1252	1113	1106
Mean temperature of retort, degs. C. lower part	—	—	1302	1288	1378	1330
,, ,, ,, ,, upper ,,	—	—	1227	1209	1243	1204
Coke used for heating, per cent. by weight of coal carbonized	16·25*		14·1	14·5	15·0	13·9
,, ,, ,, lbs. per 1000 cubic feet of gas made	31·3*		23·0	28·8	24·4	25·7
Gas made per ton of coal, cubic feet dry at 0° C. and 760 mm.	10,887	10,495	12,865	10,665	12,878	11,349
,, ,, ,, ,, saturated at 60° Fahr. and 30 inches.	11,680	11,259	13,802	11,442	13,816	12,175
Illuminating power of gas, candles per 5 cubic feet (at 60° Fahr., 30 inches and saturated) per hour in No. 2 "Metropolitan" argand burner	15·37	16·45	12·11	15·94	12·3†	13·75†
Calorific power, B.Th.U. per cub. ft. at 60° Fahr., 30 ins. and saturated, gross	596	604	538	585	562	591
,, ,, ,, ,, ,, ,, ,, ,, ,, net	535	543	482	524	501	527

* This figure refers to wet coke and even so the consumption is high because only one setting was at work at the time. Moreover, Dr. Colman and Mr. Broadberry state that it was impossible in the short time at their disposal to obtain reliable figures under this heading.

† These figures are values inferred from the results of testings made with a batswing or slit flat-flame burner.

runs of vertical retort-settings, and partly to results obtained over working periods of considerable length. Hereafter there will be little to be said of short trial runs. It will be useful to indicate, however, at this stage that the results obtained in the trial runs have not differed appreciably from those obtained in continuous working. In this article six sets of figures (excluding those obtained with very little steam by Dr. Colman and Mr. Broadberry at Dessau) have been reported for the make of gas per ton of coal in vertical retorts with steaming. Two sets of figures refer to 5-metre retorts at Oberspree and two sets to the same retorts at the Mariendorf works; while the other sets relate to the installations of 4-metre vertical retorts at Cologne and Zürich. Averaging all the figures thus obtained from these works, using different descriptions of coal, it will be found that the mean make of gas per ton of coal amounted to no less than 13,341 cubic feet, and that the mean gross calorific power of this gas was 557 B.Th.U. per cubic foot. The lowest make was 12,540 cubic feet, and the highest 13,816 cubic feet per ton; and the highest calorific power 592 B.Th.U., and the lowest 536 B.Th.U. per cubic foot. The practical working results over an extended period at the Cologne and Oberspree works were in one case a little below, and in the other a little above, the mean figure quoted for the make of gas. It may therefore be taken as having been fully established in May, 1908, that the Dessau vertical retort, whether of 4 or 5 metres length, was capable of giving a make of gas of about 13,340 cubic feet per ton of coal carbonized, which gas would have a gross calorific power averaging 557 B.Th.U. per cubic foot. This corresponds to something more than the standard of calorific power provisionally proposed in the Gaslight and Coke Company's Act of 1909, of 125 calories net per cubic foot. Hence it will be seen that, with a make of 13,340 cubic feet per ton, the Dessau vertical retort had been proved in the spring of 1908 to be capable of producing a gas fully equal to the most exacting requirements prevailing in London in regard to the quality of gas supplied.

(*To be continued.*)

TAR PRODUCTS FOR TIMBER PRESERVATION.

A FEW months ago, the American Society of Civil Engineers had before them a paper by Mr. Walter Buehler, one of the members, on the subject of the development and scope of timber preservation. It gave rise to a discussion; and the remarks of two of the speakers are contained in the "Proceedings" of the Society for the past month. One (Mr. R. Lamb) made some interesting remarks on the materials used for preserving timber; and from them we take the following particulars.

There is no longer any question as to the feasibility or advisability of preserving wood. That which would without treatment decay too quickly to be of commercial value becomes valuable when preserved. In order to determine the best attributes of coal tar for preserving, Mr. Lamb said he knew of no surer method than to take samples of treated wood of known history, and make analyses by fractional distillation of the oil remaining in the wood. This was done some time ago by the United States Forestry Department. Their tests showed that the piles which endured had been preserved by an oil which left in the wood an average of nearly 26 per cent. of naphthalene; and one sample showed 48 per cent. They had likewise a good percentage of anthracene, which is of equal importance with naphthalene as a preservative. The average quantity of creosote taken from paving-blocks which had been in use 20, 29, and 34 years was 16·14 lbs. The naphthalene and anthracene percentages were conspicuously large. Tar acids or volatile oils are strong antiseptics. Though their stay in the wood is comparatively short, they exert an antiseptic influence on the bacteria of decomposition, and render a valuable service thereby. Mr. Lamb considered, however, that all the antiseptics needed were found in the naphthalene and anthracene remaining in the wood, and not more than 1·5 per cent. of tar acids should be admitted in the creosote oil used for wood preservation.

The various kinds of creosote are dependent upon the sources of supply, which are: (1) Wood creosote oil, (2) bye-product coke-oven distillate, (3) water-gas tar distillate, (4) coke-oven distillate, (5) coal-gas tar distillate. These are numbered in the order of their value as sources for getting the oil containing the best constituents for preserving wood, as determined from the results of tests of woods treated, compared with the length of time they would have lasted without treating. Of late years, bye-product ovens have been perfected, and the Otto-Hoffmann process has been established in America to make various products from the distillation of coal; but because of the high cost of the plants, its general introduction has been slow. These plants make coke, illuminating gas, sulphate of ammonia, and the bye-products of coal tar. The residuum, after the foregoing valuable products have been extracted, is pitch of 1·12 sp. gr., containing but little naphthalene and anthracene.

Mr. Lamb expressed the opinion that water-gas tar or pitch is as good as the bye-product oil—in fact, it is very similar; and it is more plentiful. In a paper by Mr. Charles N. Forrest on "Preservatives for Wood Paving Blocks," which appeared in "Engineering Record" early last year, bye-product tar and water-gas tar are compared. The author said: "From the data already presented, there appears to be no reason why coal tar should be bettter than water-gas tar for the preservative treatment of wood paving-blocks; but the following comparison of creosote oil distilled from water-gas tar with creosote oil distilled from coal-gas tar will undoubtedly be of interest to engineers who are concerned in the preservative, aside from the waterproofing, features of this tar." The following is the comparison referred to:

	Coal-Tar Creosote.	Refined Water-Gas Tar.
(1) Original specific gravity at 15° C.	1·04	1·14
(2) Fraction distilling below 315° C.	84·8 p.ct.	16·00 p.ct.
(3) Fraction distilling above 315° C.	13·8 ,,	54·3 ,,
(4) Total distilling from the oil.	98·6 ,,	70·3 ,,
(5) Coke remaining in the retort	1·4 ,,	29·7 ,,

The comparison of the three oils is as follows:

	Creosote Oil.	Coal Tar called Creosote.	Water-Gas Tar.
(1)	1·04	1·122	1·14
(2)	84·8 p.ct.	34·2 p.ct.	16·0 p.ct.
(3)	13·8 ,,	41·8 ,,	54·3 ,,
(4)	98·6 ,,	76·0 ,,	70·3 ,,
(5)	1·4 ,,	24·0 ,,	29·3 ,,

In view of the past failures of water-gas tar as a wood preservative, Mr. Lamb asked: "What engineer wishes to specify that oil, or what company wishes to guarantee it? If it is a hazard to use water-gas tar, why is it not also a hazard to use bye-product tar, which is practically the same? If specifications did not demand that the oil shall be the product of coal, either oil could be used under the specifications." He thought the Society should appoint a Special Committee to investigate the subject thoroughly and independently, and compile specifications strictly from an engineering standpoint. Personally, he believes that the most desirable specification for creosote for all wood preservative purposes is as follows: The creosote should be not less than 1·03 sp. gr. at 38° Fahr., and not more than 1·07 sp. gr.—the latter in order to ensure thorough penetration. A fractional distillation, using 100 grammes of creosote, should show percentages of dry oil by weight about as follows: Up to 150° C. (302° Fahr.), no distillate; between 150° C. and 170° C. (338° Fahr.), not to exceed 1·5 per cent.; between 170° C. and 235° C. (455° Fahr.), not to exceed 35 per cent.; between 235° C. and 300° C. (572° Fahr)., not to exceed 35 per cent. The residue should be soft. The oil should contain not less than 25 per cent. of naphthalene and at least 15 per cent. of anthracene oils. Of the creosote oil, 95 per cent. should be soluble in carbon bisulphide, and equally in absolute alcohol. This specification would, in Mr. Lamb's opinion, have met the requirements for a creosote as good as any used in the tests as reported by the officials of the Forestry Department. If a specification for creosote were standardized by the Society, the coal-gas manufacturers would, he believed, make their creosote conform to it with sufficient closeness; and the many beehive coke-oven operators could be induced to distil their waste product for this specific oil. As it was now, many specifications were demanded, and there was no assurance that any one formula of oil a company might produce would command a market. It was a fact that neither the bye-product oil nor the gas-tar oil had been tried for wood-block paving for a longer time than good heart pine would last. If real creosote were used, short-leaf pine could be specified, at a saving in cost for wood of at least 15c. per square yard for blocks 3½ inches deep.

More Glover-West Verticals for Australia.

Messrs. William Coward and Co., Limited, have received instructions to place a second contract for vertical retorts of the Glover-West pattern. On the present occasion, the installation is on behalf of the Newcastle Gas and Coke Company, New South Wales, for whom this firm also acts in England. Messrs. West have already in course of preparation a very large installation of vertical retorts for the Australian Gaslight Company, of Sydney; and they are under engagement to supply the whole of this plant within thirteen months. Both plants will have to be erected and in working order for the winter of next year, which in Australia is, of course, the antithesis of our own.

Carburetted Water Gas and Increased Storage at Rome.

We learn that the Anglo-Romano Gas Company have placed an order for an installation of carburetted water-gas plant with Messrs. Samuel Cutler and Sons, Limited. The installation will be the first carburetted water-gas plant to be erected in Italy, and will comprise three sets of plant, together with all the supplementary apparatus to make the installation a complete accessory to the coal-gas section. Messrs. Cutler have also made a contract with the same Company for the construction of a 2¼-million cubic feet capacity gasholder and steel tank; the firm having just completed three gasholders and steel tanks for the new gas-works of the Anglo-Romano Company. All the gasholders are constructed with the "Cutler" system of guide-framing, of which Messrs. Cutler have already seven examples in Italy—either in course of construction or completed.

"DEFLECTOR AND SLIT BUNDLES" FOR ROTARY WASHER-SCRUBBERS.

"Bundles," as a means for conveniently packing the interior of rotary washer-scrubbers, have formed the essential parts of such apparatus for many years past—indeed, almost from the very commencement of this form of plant, when the late Mr. Kirkham and Mr. David Hulett joined Messrs. Chandler in patenting the old volute and the better-known apparatus with the "central opening," and both of which patents were secured as far back as the year 1877.

In looking up the matter, one finds that the first intimation there is of "bundles" being introduced for the purpose was in the year 1878, when a provisional specification for a patent was filed by the late Mr. Samuel Chandler, sen. (No. 4525); and it would seem that "bundles" for forming wheels have ever since been adopted in rotary machines of one kind or another. But, according to what is now before us, the "deflector and slit bundle" of a patent taken out last year (No. 19,207; Aug. 16) by Mr. Samuel Chandler and Messrs. Robert Cort and Sons, Limited, is the latest improvement in the idea. We imagine after perusal there seems to be a fairly good prospect before it, especially in these days of keen competition which without doubt exists.

The inventors describe a washer-scrubber consisting of a number of thin metal sheets, segmental in form and made up into "bundles," with distance-pieces between, so as to provide passages for the gas. A number of the bundles are made to form a wheel to work within a tank divided by partitions, as described in patent No. 422 of 1877.

The patentees point out in their present specification that the objections found to coiling up iron to form wheels, as described in the 1877 patent are obviated in the present arrangement, as (1) the segments are made of a gradually increasing size, built one over another—being thin pieces of sheets placed horizontally, as distinguished from the vertical construction at present employed, so as to allow of easy removal and replacement; and (2) turning or bending up to any "advantageous angle or height" two opposite ends of each sheet, so that when a number of bundles are arranged to form a wheel, which faces the incoming gas, the turned-up edges form on the outer part of the wheel an assemblage of deflectors, and a kind of louvre, against which the gas impinges during its passage through the various narrow spaces of the wetted revolving segmental wheels. In this way, the gas is prevented from taking a direct or straight course through the various bundles during purification.

The patentees say this arrangement prevents the liquor from one tank being blown onward and mixing with that in the next tank. The thin metal sheets, treated as described, form trays; the gas would be broken up, diverted, and distributed with considerable advantage; and, owing to the large open gas-way afforded above the divisions by the adoption of the usual form of horizontal

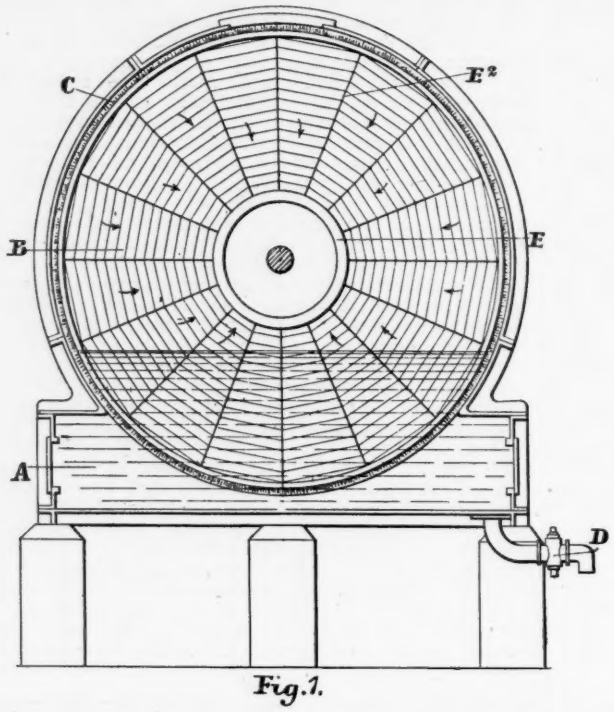


Fig. 1.

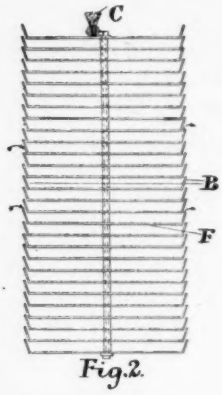


Fig. 2.

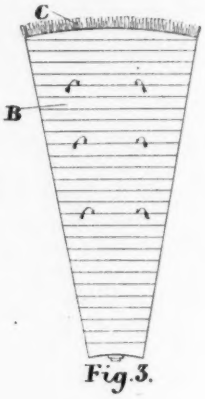


Fig. 3.

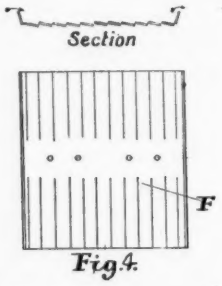


Fig. 4.

Chandler and Cort's "Deflector and Slit-Bundle" Filled Rotary Washer-Scrubber.

outer vessel for use with which this invention is designed, no back-pressure of gas would accrue, as the gas passages afforded by these newly-devised bundles avoid any appreciable difference being caused between the inlet and outlet pressure, which "is a very desirable feature and is favourable to its use."

A third and distinctly important feature in connection with the invention consists in making a large number of slits in the sheets of metal in close proximity to each other—not of a kind, be it understood, that results in any waste of metal, but simply such a slit or slits as would be made (for example) by a pair of cutting shears. The slits may be partly or slightly open, so that the gas in meeting or coming into contact with the edges so formed and presented is minutely cut up and divided into "millions of parts per hour." When the whole of the bundles or wheels contained in a complete washer-scrubber are revolved, both gas and liquor would in this way be subjected to a kind of churning treatment, the effect of which would be a "more complete purification of the gas." A number of the segmental louvre slit bundles or clusters are formed into wheels, and a number of wheels are revolved on a shaft in the ordinary divided vessel—"the various wheels working in separate divisions or tanks containing various strengths of liquors, with clean water in the last division or tank."

The result of the invention is said to be the production of a much more efficient, and therefore considerably more economical and compact, machine, which "comes within the reach of many gas managers who have hitherto considered the cost of other rotary gas washer-scrubbers prohibitive to adoption."

The gas upon entering the washer-scrubber abuts the first wheel of the series of bundles and impinges upon the outer side of the deflectors. It then enters into and flows among the numerous spaces between the bundles; passes through them; and again abuts against the inner side of the deflectors or upturned ends at the gas outlet side of the same wheel, before leaving through the louvres for the next wheel of bundles. It proceeds in like manner to and through each wheel onward, finishing at the clean-water tank.

The deflectors or louvre-like projections provide dash-plates for both the gas and liquor to strike against. A large quantity of liquor is carried up continually from the tanks, is held longer in suspension, drips from sheet to sheet, and performs a very important part (and a very desirable one) regarding the purification, through the fact of the liquor being used so many times over and over again and its strength being increased thereby.

Referring to the illustrations. In fig. 1, A is the tank in which the bundles B revolve. The arrows show the gas passing through the various spaces provided by the upturned ends of the plates. These and the louvre-like projections are also shown in figs. 2 and 3. C is a ring of brush material fixed to the top of the bundles; so as, when the wheel is revolving, to rub against the tank and prevent gas passing unwashed. D is a tar-cock. One is attached to each tank. E is the casting keyed on a common shaft on which the bundles rest. E_2 are two narrow T iron spokes springing from the casting, into which the bundles slide. The spokes are jointed together by a ring at the top of the wheel, to which ring the bundles are secured separately at their upper ends in the ordinary way. F (fig. 4) are slitted sheets slightly separated from each other, so as to produce cutting edges and thus divide up the gas.

RETORT-SETTINGS AND GAS-PRODUCERS.

As mentioned in the "JOURNAL" last week, at the meeting of the Western Division of the Scottish Junior Gas Association on the 11th inst., Mr. J. MURRAY, of Glasgow, read a paper bearing the above title.

The following are some extracts from the paper, which was illustrated by lantern views.

When I joined the Glasgow Corporation Gas Trust engineering staff in 1886, the retort-setting at our Tradeston station was the simple coke-fired setting with open grate. As this is now out-of-date in all well-regulated works, I will only mention a few of its defects. These are: (1) The coke used for getting up the heats in the setting is burned to carbonic acid direct in the furnace, and it is necessary to have the retorts as near to this source as possible; thereby causing local heating, and tending to destroy the retorts and setting. (2) The inrush of cold air every time the furnace door is opened for recharging and clinkering lowers the heat in the setting. (3) The use of cold coke in the furnace is always very objectionable.

The carbonizing results obtained from this setting were as follows: Labour cost 3s. 3d. per ton of coal carbonized; and 52 per cent. of the coke made per ton of coal was used as fuel for heating the retorts.

In reconstructing the Tradeston works in 1888-9, we introduced the Siemens-Foulis regenerative system of gas-firing for the retort-settings. The design is recognized in Glasgow as the "pot" producer system of gas-retort firing. In introducing this setting, we brought down our carbonizing labour expenses from 3s. 3d. to 2s. 1d. per ton of coal carbonized—a reduction of 35·89 per cent. We also reduced our fuel account from 52 to 33 per cent. of the coke made per ton of coal carbonized, or a reduction of not less than 36·54 per cent. [The author showed an internal producer for a setting of eight retorts, provided with regenerators placed on each side of the furnace or producer; also the arrangement of setting for twelve retorts with internal producer.] The latter retorts are 9 feet long over all, 21 in. by 15 in. inside measurements, heated by a semi-internal producer, which is cleaned once in 24 hours. The retorts are drawn and charged every 4½ hours, and the producer receives a supply of coke drawn direct from the retorts every 2¼ hours. The average weight of coal carbonized per retort is 14½ cwt.; and the average make of gas per ton (corrected to 60° Fahr. and 30 inches barometer) is 10,250 cubic feet. Other figures are: Coke produced per ton of coal carbonized, 1300 lbs.; coke used as fuel, 29 per cent. of the make per ton of coal; coal used, chiefly coking, with some splints and ells; average quantity of coal carbonized per oven in 24 hours, 8 tons 14 cwt.; average quantity required to heat oven, 3280 lbs.; ditto for producer, 377 lbs. per ton of coal carbonized.

EXTERNAL PRODUCER SETTINGS.

A general arrangement of the outside or external producer was shown. This installation was designed to supply gaseous fuel to 60 ovens of 12 retorts each, in all 720 retorts. The producers are 12 in number, each 9 ft. 4 in. long, 6 ft. 4 in. wide, and 13 ft. 3 in. high, constructed of mild steel plates 5-16ths inch thick, lined with fire-bricks. The flue casings are of various dimensions. One length is 805 feet long, 3 ft. 8 in. high, and 3 ft. 7 in. wide; another, 134 feet long, 3 ft. 2 in. high, and 5 ft. 2½ in. wide; and yet another, 231 feet long and 4 ft. 10 in. diameter—all being lined with fire-bricks and slag wool. Some engineers prefer this installation of outside or external producers because they get a longer life out of the retorts. In my opinion, they are making a great mistake, for this reason: If we capitalize the cost of the installation, its upkeep and maintenance, and the ground space occupied, there is as much capital sunk in it as would supply them with retorts for years to come. I consider the following figures will prove my statement:

Internal Producers.

Total cost of fittings and brick lining for 720 retorts .	£450	0	0
Annual charge for depreciation, assuming the life of the brickwork in the producer at four years, £450, at 25 per cent.	£112	10	0
Interest on the capital sum, at 4 per cent.	18	0	0
Total annual charges	£130	10	0

External Producers.

Cost of producers, flues, exclusive of fire-brick lining (life fifteen years)	£5194	0	0
Annual charge for depreciation, at 6⅔ per cent. . . .	£346	4	10
Cost of fire-brick lining £260, life three years, annual charge for depreciation 33⅓ per cent.	86	11	2
Total capital for flues, fire-brick, and land, £5627 9s. 10d., interest at 4 per cent.	225	1	6
Total annual charges	£657	17	6

DEMPSTER'S INTERMITTENT VERTICAL RETORTS.

This system is based upon the intermittent type of retort, which is distinguished from the continuous type by the improved yield of coke, and the ability to produce the best carbonizing results from various sorts of coal; thus giving great scope to the management in placing contracts for raw material. Before describing the several meritorious points of this system, I wish to emphasize the fact that the plant in its entirety has carbonized thousands of tons of various sorts of coal, and the products have been carefully recorded and tested. It may therefore be justly claimed that their system is the evolution of practical growth. Commencing at the retorts, Messrs. Dempster have improved the shape of the cross section, and find that there is less accumulation of carbon in the corners of the retort; thus facilitating the discharge of coke by gravitation. They have concentrated their energies on the setting for heating the retorts, and have evolved one having greatly improved means for controlling the heats, and a very much increased area for pre-heating the secondary air. These desirable features have been brought about by the subdivision of the setting and the regenerator, so that each division of the setting has its own regenerator, damper, and secondary air; thereby giving easy control over producer gas, secondary air, and pull in each segment of the setting. This gives absolute mastery over the placing of heats, which, of course, conduces to the best carbonizing results and low fuel consumption. The top of the setting is covered with non-conducting material, so that it may serve as a platform without discomfort to the men's feet. In order to preserve the shape of the retort and ensure a long working life, the setting is so arranged that the retort carries no weight beyond its own; the top mouthpiece being supported on cast-iron plates, which are in turn supported from the brickwork—the retort being free to expand within a socket formed on the underside of the plate. The designers early formed the opinion that the ordinary type of self-sealing lid did not lend itself to vertical retorts, as three distinct operations are required to open it, and three more to close it. By a unique application of a lever system, known as "toggle-levers," they have combined the three motions in one. The bottom lids are manipulated by a single pull by the attendant.

One of the chief merits of vertical retorts is, of course, the low wages per ton of coal carbonized; and any cheapening of this item is bound to further enhance their value to the gas profession. Messrs. Dempster's patents Nos. 19,437 and 20,850 of 1908* are simplification personified in this respect, as they save all costs of screening coal, and automatically cause each retort to measure its own charge. These very desirable features are brought about by the simplest possible piece of mechanism—a shoot of a certain shape placed in a particular position. There is nothing to get out of order, and the whole is absolutely automatic; the stoker being at liberty to perform other work while it is in action. The shoot is lowered into the retort by the swing of a hand-wheel. The charging of the retort continues until the coal fills up to the exit of the shoot, when no more can flow. Each retort is filled quite automatically up to a pre-determined level; and it is impossible for the stoker to put too much or too little coal into the retorts. Therefore, without any watchfulness on the part of the stoker, the ideal results are obtained. To fully explain the merit of this feature, the designers point out that an accumulation of carbon, averaging ½ inch thick, will reduce the capacity of the retort by 1 cwt. of coal. It will therefore be seen that by making each retort measure its own charge they have achieved something of great utility. Before charging a retort, a measured quantity of breeze is put in, so as to fill the bottom mouthpiece and the lower end of the retort up to a point where the carbonizing temperature is reached. For this purpose, the patent shoot is provided. It is divided into five equal compartments, so that as it is filled from the overhead hoppers the breeze fills the compartments; and thus the stoker, without any extra work whatever, is provided with five measured quantities of breeze for five separate retorts.

The hydraulic main is made of a shape which, in conjunction with the inclined dip-pipe, causes the sediment to collect in the open atmospheric portion of the main, from which it is readily removed by a shovel. Throughout a winter's work, they have not had a single stopped pipe; and the main is cleared every week, which occupies about ten minutes. The main is provided with self-sealing lids over the continuous open lute; thereby saving loss of ammonia by evaporation, and preventing oscillation of seal. A liquor seal is maintained by the tar-tower; but an auxiliary tar-pipe and seal-regulating valve are arranged on the main, which, being set at a slightly higher level than the tar-tower coal-regulating valve, come into play automatically if a choke occurs in the tar-pipe leading to the tower. This might happen, but over the winter's work it has not occurred. A retort-house governor is installed, and anti-dips; and the hydraulic main is kept at 1-10th inch pressure—thereby ensuring that no furnace gases can get among the coal gas, while at the same time permitting the gas to leave the retort freely, thereby preserving its illuminating power at the highest value.

This description completes Messrs. Dempster's system proper, But attention may be directed to the design of the retort-house. which lends itself readily to the vertical retort installation, also to the storage-hoppers, which store 24 hours' supply of coal, furnace coke, and breeze for the bottom mouthpiece; and while there is 7 ft. 6 in. headroom beneath the hoppers, the total height from the floor to the top of the hoppers is only some 35 ft. 9 in.

THE WOODALL-DUCKHAM SYSTEM.

The principle of this system is the regulated continuous descent of coal through a suitably heated and constructed vertical retort. The plant consists of vertical retorts arranged four in a setting, with a generator and regenerator for every setting, and a brick

* The patented arrangements here referred to were fully described and illustrated in the "JOURNAL" during 1906—see Sept. 7, p. 640, and Oct. 5 and 12, pp. 27, 125.

and steel chimney common to each pair of settings. The retorts are 25 feet long, of tapered cross section, 4 ft. 6 in. by 9 in. at the top, and 5 ft. 3 in. by 1 ft. 6 in. at the bottom. The walls of the retorts are formed of brick 9 in. by 6 in. by 4½ in. (grooved and tongued so that leakage at the joints is prevented), and with panels formed in the backs of them so that the heat can readily pass through the walls to the charge in the retort, and a large surface is presented to the heating flues. The heating flues are vertical; and the division walls are formed of tongued and grooved bricks bonded into the retort walls and also into the back walls of the flues. The gas from the producer is admitted at the top of the flues through regulatable nostrils, and secondary air at several points below, so that the amount of heat can be regulated to the various portions of the retorts. The generator and regenerator are constructed to one side of the settings. The generator is of ample dimensions; and the depth of fuel from the fire-bars to the gas off-take is always constant. The regenerator has about 10 per cent. greater area than is usual with horizontal settings of the same capacity, and is of the sandwich type. The walls between the waste-gas and the secondary-air flues are formed of the special grooved and tongued panelled blocks used in the walls of the retorts. Dampers are provided at the bottom of the retorts, so that the pull can be regulated to each side of every retort. Main dampers are provided on the waste-gas outlet of the regenerator.

At the bottom of each retort is a cast-iron hopper, with the back formed of a curved plate. This is set at such an angle as to take much of the weight of the charge in the retort. Across the hopper at the bottom of this back plate is fitted the "extractor roller," built up of cast-iron cross pieces mounted on a square shaft, and forming four helical blades. The roller when stationary prevents the discharge of the coke, and when rotated governs by its speed the amount of coke extracted. The average speed of the roller is about one revolution in 50 minutes; but is easily variable by screw regulation. This feature is peculiar to the Woodall-Duckham system, and is of the utmost importance, as by its use each retort can be worked at its proper speed to suit varying conditions of coal, heats, and required output. The roller continually and evenly discharges the coke; causing a gradual descent of the charge in the retort. The top of the retort is closed by a cast-iron mouthpiece, on which are mounted the coal-feeding devices and the gas off-take pipe.

The feeding device is formed of a cast-iron cylinder revolving in a casing. The cylinder has a single mouth, which when turned upwards receives the coal from the hoppers, and when turned downwards deposits sufficient coal in the retort to completely fill it. In order to ensure that the retort shall be always full, the feeding device is actuated at such a speed that there is always an excess of coal retained in it. The average speed of the feeding device is one revolution per minute. It is driven by means of a toothed ratchet gear, connected to a rocking shaft extending the length of the settings. The gas off-take, which is 7 inches diameter, is connected to the top mouthpiece through an extension upon it. The pipe falls from the retort towards the foul main, and forms a connection with this by means of a dip-pipe and seal-pot. The bottom of the pot is connected to the tar-pipe, and in ordinary working all tar and liquor formed flows from the off-take pipe and foul main direct to the tar-pipe; but when it is desired to shut off the retort from the foul main, the valve in the connecting tar-pipe is closed, and a 6-inch seal is formed in the seal-pot, effectually shutting off the retort.

The author enumerated the advantages claimed for the system, and gave the following results of tests made at the Nine Elms station of the Gaslight and Coke Company on April 22, 1910.

Coal used (Strafford nuts)	8·7	tons
Gas made	106,814	cub. ft.
Gas per ton	12,277	,,
Coke per ton	15·1	cwt.
Average illuminating power	16·58	candles
Gross calorific power	609·6	B.Th.U.
Net ,, ,,	548·8	,,
CO_2	2·1	per cent.
O_2	0·4	,,
Illuminants	3·3	,,
CO	7·7	,,
Sperm value	697	
Fuel used per ton of coal carbonized	3·1	cwt.

The Glover-West System.

One of the central features of the Glover-West vertical retort system is the heating of the retorts. In this setting, the combustion chambers are constructed in sections, each under separate control, so that the heat in any particular length of retort can be varied at will. In this ease of heat regulation may be found the explanation of the ready manner in which any description of coal can be successfully carbonized in these retorts. The heating chambers begin at about 4 to 5 feet from the top of the retorts, and are continued downwards to within about 3 feet of the bottom. The hot gases pass completely round the retorts in each of the sections, and then return into one common waste-gas chamber; the heated gas ascending upwards and circulating round the top part of the retort on its way to the chimney. At the bottom part of the retorts, or, as it is called, the "regeneration section," there is another new feature. The secondary air is made to pass round this part of the retort, and in so travelling it is heated by the hot coke descending to the coke-chambers. There is a reciprocal advantage in this; for not only is the air heated but the coke is cooled. This accounts for the cool state in which the coke issues from the retorts, as well as for, in large part, the economy in fuel; the fuel being 10 to 12 per cent. of the coal carbonized. The heated portion of the retorts is 20 feet long, and the cross-section at the top is 30 in. by 12 in., and at bottom 35 in. by 21½ in. In this connection, it should be noted that the total length of retort is 23 feet, and that the lower 3 feet is really not carbonizing space. Yet from 2½ to 3 tons of coal can be passed through each retort in 24 hours.

Having enumerated the advantages claimed for the Glover-West system, and illustrated it as in use at St. Helens, by lantern slides, the author stated that it is being adopted at home and abroad; installations being introduced at the Rochdale, Lurgan, and Helensburgh Gas-Works, as well as at Sydney (N.S.W.), Fitchburg (U.S.A.), and Tokyo (Japan).

In conclusion, Mr. Murray called attention to the results obtained by Dr. Colman at St. Helens Gas-Works with Thornley coal carbonized in Glover-West retorts; and he reproduced the particulars of his tests as given in the "Journal" for July 20, 1909. He also acknowledged his indebtedness to Messrs. R. Dempster and Sons, Limited, of Elland, Messrs. Duckham and Cloudesley, Limited, of Westminister, and West's Gas Improvement Company, Limited, of Manchester, for the loan of models, sketches, and the lantern slides to illustrate his paper.

Discussion.

Mr. G. H. M'Cowat (Glasgow) remarked that early in the session the President gave them some figures which were favourable to external producers. Mr. Murray had now championed internal producers. It was hard to understand how the external should supersede the internal. He admired the way in which Mr. Murray had compared the costs of the two systems; but he thought it would have been more instructive if he had carried the matter a little farther. Dealing with Mr. Murray's figures, he would arrange them under the main headings of capital cost, with annual charges; cost of renewals; cost of labour; and, lastly, cost of fuel. He had not taken any account of the cost of repairs, as he assumed that they would be much the same in both cases. Accepting Mr. Murray's figures as to annual charges for depreciation and interest on capital costs, these were: For internal producers, £130; for external producers, £657. Some said that four years was the life of an internal producer. Though he thought this was rather high, he had adopted it; and taking the President's figures for the life of ovens fired by external producers at seven years, they got for depreciation charges: Internals, £1193; externals, £657. The cost of labour for 720 retorts for 24 hours worked out, he found, at £8 14s. 3d. Adopting the President's figure of £2 4s. 3d. for 360 retorts, the labour for 720 retorts would be £4 8s. 6d. Taking 300 working days in a year, the cost for internals would be £2617, and for externals £1327. As to fuel, taking a very generous estimate as regarded internals, and comparing it with the President's figure of 36 per cent., allowing 12 cwt. of coke per ton of coal carbonized, and sold for 7s. 6d. per ton, they got for fuel for 300 working days £10,935 for internals, and £13,918 for externals; a gross total for internals of £14,825, and for externals of £15,779. This was a difference of £904 per annum in favour of internals, when dealing with 720 retorts; and capitalized at 4 per cent., it was £22,600. The portion of the paper dealing with vertical retorts, taken with the models and slides, was especially interesting and instructive. They seemed to be on the verge of a revolution in carbonizing plant; and should the results obtained from the working of such plant lead to the general adoption of vertical retorts, the juniors would be in the peculiar position of starting almost on the same level as the seniors. There seemed to be no end to the number of ideas embodied in this plant; and there was no little difficulty in reconciling the various differences or advantages. For instance, the idea of the Dempster plant seemed to be to keep small stuff next to one side of the retort, leaving the other side open for the escape of gas. According to the latest ideas from German practice, they wanted the escaping gas to be kept as far as possible from the intense heat of the sides of the retort. Did this bringing of the gas to the heated side of the retort affect the ammonia and the naphthalene? Perhaps some of the members would give their experience in regard to this.

Mr. Alex. Wilson (Glasgow) said that he did not propose to discuss the paper, and especially the figures given by the author. He would only say this, that figures, or figures which only showed part of a process, could be read in any way; and as far as a comparison between external and internal producers was concerned, they required to have all the figures in front of them before they could judge as to which was the best system to adopt. He would not deal with any of the figures, beyond saying that he was very well satisfied with the results obtained at the Provan works, where outside producers were installed. He wished they could get similar results in the other works. If they could do so, they would be able to reduce the price of gas still further. The members were indebted to Mr. Murray not only for his own information upon the matter dealt with, but also for the information they had received from the patentees of the various processes put before them. They could not know too much about vertical retorts, because there was no doubt that they were to be the system of carbonization to be used in the future. Most of the members probably knew that they had been experimenting in Glasgow with a system of their own; and he would be very glad to give them an opportunity of going to the Temple works, and examining it, before the session ended. The results from their experimental setting were so satisfactory that

he had just been able to lay figures before the Works Committee of the Corporation, who had sanctioned an installation of 744 retorts, capable of producing between 4 and 5 million cubic feet of gas per day. These were to take the place of one section of a horizontal retort-bench which produced daily about 2 million cubic feet of gas. The members would see that there would be the advantage of having a much larger production of gas on the same ground space. But there were other advantages. He believed they would be able to effect a very large saving in this matter; and he thought they might look forward to the time when they would be working at Dawsholm with nothing but vertical retorts. He could not say what they might do at the other works. Provan had done so well that he would be loth to take away the present system; but at Dawsholm the works had served their day and generation well, and he would have not the slightest hesitation in replacing the old-fashioned plant by something newer.

The PRESIDENT (Mr. J. Frazer, of Provan), on behalf of the Association, accepted Mr. Wilson's offer, and proposed a hearty vote of thanks to him for his invitation.

This was heartily accorded.

Mr. F. CUTHBERT (Kirkintilloch), continuing the discussion, said he was somewhat surprised at the difference of opinion as to external and internal producers. He had always regarded the external producer as an ideal means of supplying gas to retort-settings, because they had a producer to themselves, as it were, and could supervise it. The external producer led to more comfortable conditions of labour. The figure of 26·7 lbs. of sulphate per ton of coal carbonized yielded by the Glover-West process seemed to him to be rather low, considering that in some works equipped with horizontal retorts they could get from 28 to 30 lbs. Mr. Murray spoke of about four years as being the life of an internal producer; but with the heats they worked with now, he thought that time was fairly high.

Mr. J. WILSON (Falkirk) said that when they introduced the pot producer the reduction of fuel was practically one-third—36·54 per cent.; and the reduction of carbonizing wages was almost the same figure—35·89 per cent. There was something else, surely, at the back of this. The installing of a pot producer would hardly make all the difference. The retorts put in with this producer must have been of a larger size, or perhaps there were more of them—possibly a setting of twelve taking the place of six or eight. One-third of the carbonizing wages did not correspond with one-third of the fuel in the furnace. He had looked up the figures given by the President, and, taking an average of the extra coke required for the external producers, and the saving of wages, it brought the externals and internals almost on a par—in other words, the outlay for a year was about the same. Then, of course, on the top of this they had to put the advantages which were quite rightly claimed for gaseous firing by outside producers. The life of the retorts was no doubt lengthened in this way, because by means of gaseous firing they were able to regulate to a nicety the heat in a setting, which was what they wanted, and were able to distribute the heat so as to get an even temperature all through the setting; and this was conducive to the maximum output of gas per ton and per mouthpiece. They had, in the case of internal producers, the opening of the producer for the purpose of clinkering and filling up. This caused an inrush of cold air, which could not be avoided; and the inrush produced variations of temperature. This meant expansion and contraction, which was the trouble of all internal producers. These producers required a big arch over the top of the furnace. With gaseous firing this could be avoided, and the constructional design of the setting would be made more simple, and therefore stronger. It being more uniform, the setting would expand on all sides more equally, and they would not have the pushing up of one retort and the dropping down of the next, and so forth, as they had now. At present they used coke in outside producers. There were very fine systems in which cheap dross was used in producers, for the purpose of making producer gas, with the resultant recovery of residual products. Could this not be extended to retort heating for gas-making purposes? Could they not use dross, and recover the bye-products, instead of using coke? They could get a cheap dross, and would be able to sell the coke which would otherwise require to be utilized in the making of producer gas. This would be a saving of the price of the coke used, less the price of the dross, and, of course, the saving would be augmented by the returns received in due course from residual products.

Mr. A. H. WHITELAW (Glasgow) thought the paper was the climax to a discussion they had in the Association four years ago, as to which were the more advantageous, heavy or light charges. He believed he was safe in saying that six years ago 75 per cent. of the gas managers in the United Kingdom were convicted that light charges were proper; and it was astonishing to him that they had been so long in coming to the idea that heavy charges were the right thing. It made a very interesting bit of reading to go back and see who were the people who backed up the heavy charges. The more coal they could get into a retort the better. They had already had many opportunities of seeing this done, not in gas-works but in coke-works. They had also seen vertical retorts at work in shale-works. Now that they, in the gas profession, were falling into line, the question cropped up as to whether vertical retorts were more advantageous than horizontals taking the same charge. He did not think there was very much difference between them, though he had not gone into the figures, and had not seen the question discussed. He believed that the whole reason for going in for vertical retorts was the saving of the ground space required for a given quantity of coal carbonized. Regarding producers, as there were so many conflicting opinions on the subject, they had better take time to consider it and look into it; but it was very gratifying to know that both systems were giving such satisfaction in Glasgow.

Mr. D. FULTON Glasgow) pointed out that the President's comparison as to labour costs was of external producers heating twelve retorts with internal producers heating only eight. He should like to inform Mr. Wilson that labour costs, with internal producers heating twelve, were practically the same as with external producers heating twelve. Mr. Murray committed himself to the opinion that he preferred internals heating twelve to externals heating twelve. He had not explained why he had done so as fully as he might have done.

Mr. J. WILSON recalled that Mr. Allan, of Scarborough, in a letter to the "JOURNAL OF GAS LIGHTING" recently, pointed out that the lining of a producer for a carburetted water-gas plant wore out in about 600 working days, and that he looked into the matter, and was satisfied that it was the workmanship and not the material that was at fault. He then put on experienced men to do the work, and the lining they built lasted for 2200 working days, which was nearly four times as long. By good workmanship and having good workmen, there was a gross saving of 75 per cent.

The PRESIDENT acquiesced in the statement that partial figures were of very little use to them. They must begin, as he did in his Presidential Address, at the coal-hopper and go on to the waggon, if they wanted to get a comparison as to costs. In the first place, there was the life of the lining. Mr. Murray claimed four years for an internal producer. He (the President) had never known the lining of such a producer run for four years. He thought that if they got 365 working days out of it, they were getting value for their money. If Mr. Murray would tell him whether the 720 retorts were in settings of eight or twelve, he would have an idea as to what the material of the lining would cost.

Mr. MURRAY: They were twelves.

The PRESIDENT said then the lining of each producer would cost £12. This was very cheap, because it took £24 to line an external producer. Mr. Murray credited outside producers with a life of only three years. Outside producers had been in operation at Provan for seven years, and they had not relined a producer yet. He had taken note for five years of the cost of special bricks, and found it to be £231. If brought down to one year, it came to only a very small sum. He had not access to the actual costs of the flue casings and steel work. Mr. Murray gave £5194, and the life fifteen years. He (the President) certainly did not consider he had overdone the life of the steel casings and the flues. If the life of the internal producers was taken as 365 working days, this added materially to the cost; and if they multiplied the life of three years by two, it took away considerably from the life of the external producers. As he pointed out, repairs in their works were practically trifling. The bench to which he referred in his address as about to go on again had been on from the week following. It was put off a fortnight ago, and scurfed, but not pointed, with the idea of letting it down. But the fog came on, and two bricklayers and four labourers were set at half-past four in the afternoon to point-up the bench. It was charged by half-past seven, and went on to work at ten o'clock at night; and it was still working. So, if they took only one retort per annum out of 720, and multiplied 720 by £45, which he thought was the price of a retort, they would run up the expense of a retort. They could not rely upon figures alone; they must go into facts along with the figures. Mr. Wilson, of Falkirk, had spoken in regard to the filling of the producer with dross. He (the President) had an idea that ultimately gas would be a bye-product of gas-works; and Mr. Wilson seemed to be viewing the subject through the same spectacles as he was. It would be a case of making coke out of anything they could lay their hands on. He thought Mr. Wilson's was an idea which was worthy of consideration, because they could buy dross at almost any price. He wished, in the members' name, to thank Mr. Murray for the excellent paper he had given them.

Mr. MURRAY briefly returned thanks.

An Italian Directory.—We have received from the editorial department of our contemporary "Il Gaz" (Venice) the second edition (1910-11) of the Gas, Electricity, Water, and Telephone Directory which has been produced under the supervision of Cap. Vittorio Calzavara, the Editor and Manager of that publication. It is a *vade mecum* for gas and electricity engineers and suppliers of appliances connected with the gas, water, electricity, and telephone services. Preceding the directory portion of the book are some useful tables, formulæ, &c. The varied contents occupy 870 pages; and the price is 10 lire (8s.).

Estate of the Late Captain Heathorn.—Probate of the will of Captain Thomas Bridges Heathorn, R.A., one of the Directors, and for a time Chairman, of the South Metropolitan Gas Company, who died on the 23rd ult., as already announced in the "JOURNAL," has been granted to Mr. F. W. Emery, his Solicitor, and Mr. Frederick Nicholls, his valet. Deceased left estate of the gross value of £75,750, with net personalty sworn at £74,506. Among the bequests are £1000 to Mr. Charles Carpenter, the Chairman of the Company, £4000 to Mr. John Ewart, a Director and until recently Vice-Chairman, and £1000 to Mr. Frank Bush, another Director and formerly Secretary.

THE LIGHTING OF SCHOOLS.

The members of the Illuminating Engineering Society were engaged last Thursday evening, at the Society of Arts, with Dr. S. P. Thompson, F.R.S., in the chair, in considering the question of "School Lighting."

The first paper was read by Dr. James Kerr, M.A., Medical Officer (Education) of the London County Council. He treated of the natural lighting of school rooms; but, as this does not immediately concern us, the greater part of his paper must be passed over, interesting though it was from the point of view of those who have to see that such places are properly lighted during daylight hours. Among incidental remarks, he observed that it is in consideration of eye diseases that school lighting is of most importance to the doctor. He mentioned that the first man to work extensively at school lighting was Dr. Hermann Cohn, of Breslau; and, proceeding, he described a number of instruments used for testing illumination in school-rooms. In later remarks, he said that in the very young school child, the mental effect seems largely proportional to the volume of retinal stimulus. The larger the image of a letter, for instance, the better it is recognized. There is a mental concentration required to recognize a letter which is quite well known but which is also projected as a very small image on the retina. This means fatigue, which the young child always avoids as far as possible. Again, the undergrown or the underdeveloped eye of the young child, with its short axis, means an excessive amount of effort of the ciliary muscle to accommodate the lens, and focus the image on the retina, especially for near things. The author thinks young children often give up the fatigue of accommodating to get a clear image, and, by bringing their heads nearer the object, get a large image, not so well focussed perhaps, but giving a greater retinal stimulation. Poor illumination affects this retinal stimulus, and leads to the eyes coming nearer the work; and this short eye to work distance is the earliest and worst school habit in its ultimate effects on the eyes, if these are in any way liable to damage. So that good lighting is particularly necessary in the infant departments.

The second paper was read by Dr. N. Bishop Harman, M.A., Lecturer in Ophthalmology at the West London Post-Graduate College, and Oculist to the London County Council. In the course of it, he said with the extraordinary improvement in school building that has marked the last thirty years, and particularly the ever-extending uses of school buildings for evening classes, a demand for satisfactory artificial lighting has arisen; and the rapid advances in methods of illumination give ample opportunity for satisfying the demand. He hoped to succeed in showing that the plan upon which any scheme of lighting must be laid out is really quite simple, and that it is the same for all kinds of illuminants, whether oil, gas, or electricity. Difficulties will arise only in so far as the actual structural conditions of rooms are irregular, or the illuminant at disposal is lacking in flexibility.

Having mentioned that the photometer that has been in use in London schools for several years is that of Wingen, he said, in regard to the minimum desk illumination, that the possibility of distinguishing one object from another by sight depends primarily on the illumination of the object and its surroundings. From a number of experiments, the least possible illumination permissible on the school desk of a child has been found to be equal to 10 metre-candles.

Gas Lighting.—Most of the London County Council schools are lighted by gas burned directly as an illuminant at the jets of fishtail or batswing burners, or used as a source of heat to render Welsbach mantles incandescent. The naked jet is fast vanishing; but it is of interest to give the comparative experiments of illuminating effects of naked gas-jets and of incandescent mantles performed in an actual class-room. A convenient infant classroom hung with four points of gas was fitted first with the most approved form of naked burner—Bray's No. 4, with No. 6 regulator slipped over it. The double burner gave a steady, bright flame; and there was no flaring. The desk illumination was then measured and charted. Then these burners were replaced by Welsbach "C" burners and mantles, with "Calypso" shades. Although the gas consumed with the Welsbach burners was no more (perhaps less) than that burned with the fishtail burners, the desk illumination was increased nearly three-fold over the whole room. The desk area measured 179 square feet. With naked jets the minimal illumination obtained over 26 square feet only, and then only when no obstruction—such as bodies and hands of children—came between the lights and the desks. With the Welsbachs, in no part of the desk area did the illumination fall below 10 metre-candles, while in most parts of the room there was an ample margin for the interference which bodies and hands make with the light. Then the incandescent light has the great advantages of purity of colour, absence of flicker, and reduction of smoke. The room in which the experiment was made is not cited as an illustration of good lighting; on the contrary, it is bad when lighted with naked gas-jets, since the light is insufficient, and bad with the Welsbach because the lights are wrongly placed.

Incandescent Gas-Burners.—Granting the superiority of the incandescent mantles, how can it best be employed in schools, in the upright or inverted form? The one sole advantage of the inverted burner is the absence of shadow below the light, and the correlated ease of securing good reflection. But these desiderata can be quite easily obtained with the upright gas-burner. Against the upright burner there are these counts: Greater cost, more care in upkeep, greater sensitiveness to variations of pressure and vibration, and, what is deemed an important point, a greater volume of products of combustion. However, he thinks it unnecessary to argue these points against the inverted burner; for the one good point of this burner can also be secured with a proper usage of the upright burner. Putting the converse, the one drawback of the incandescent upright burner—the shadow beneath it—can be easily overcome. In passing, he said, that inverted burners have been used in schools within his observation, and did not prove so satisfactory in the average schoolkeepers' hands.

On the particular kinds of upright burner, little need be said; but he put in a protest against the excessive liberality of the brass worker in loading the burner with metal. It adds to the cost of the burner (perhaps the maker does not always mind that); and it is objectionable for another reason—the light is wanted as near the desk as the necessary head-room will permit. This the waste brass work prevents.

Shades and Reflectors.—These are most important parts of the equipment. Without a good reflector, a Welsbach light is worse than a naked jet, because the brass work of the burner casts a black shadow beneath the light. By reflection from a shade, the light can be so distributed as to be practically perfect. For school use, the shade must needs be cheap and durable. It should reflect the light so that there is no shadow beneath the burner. It should also reflect the light so that the lamp at a given distance will efficiently cover a given area. Lastly, the shade should protect the teachers' eyes from the direct glare of an exposed mantle. The author described a number of shades with which he has experimented. Subsequent to these experiments, he marked out the details of a shade-globe such as he considered desirable; and it has been made by the Welsbach Company, and proved most satisfactory. It is no larger or heavier than ordinary shades, and costs scarcely any more.

90° Shade Globe.

60° Shade Globe.

During the last year or two, a compromise (on the score of cheapness) on this shade has been largely used in the schools. The sides of the shade subtend an angle of 65°; and the opal extends to the level of the flat plain glass bottom plate. The reflection is very nearly as effective as with a 90° shade-globe; and there is a complete absence of shadow cast by the burner.

Pendants.—Two kinds of pendants are now in use—a "two-light" and a "harp-shape." The former is the ordinary ⊥-shaped pendant, with a light at the extremity of each arm. The "harp-shape" is a single-light pendant, formed by a perpendicular length of tube suspending an elongated elliptical shaped loop. Since all rooms are not the same size, the two-armed pendant is not fitted for general use. With a properly devised "harp-shape," the lights can be placed individually where most wanted. For such a pendant there is the usual ceiling-plate ball-and-socket joint, and a variable length of tubing to suit the height of the room. The loop should be triangular in shape—one side to carry the gas, the other side should be merely a support to balance the shade. The stop-cock on the gas side should be on the bend, and quite clear of the bottom tube. The burner should screw clear on to the bottom tube, without any wasted room filled in with needless brasswork. Attention to these small practical points will save several inches in the distance of the lights from the desks, and materially improve the effective illumination.

Arrangements of Lights.—In this matter, one of the greatest reforms can be worked. Until now it would seem that the position of the pendants in the class-rooms has been set rather with a view to symmetry than to good lighting. There is often waste of light in some parts, and poor light in other parts of the rooms. It is difficult to lay down definite rules, as each class-room has to be considered by itself. But the following four points indicate the plan upon which points of light should be set out.

(1) Each class-room should be considered as being made up of two portions: (*a*) The children's area; and (*b*) the teachers' area. The lighting of these parts must be arranged independently.

(2) In the children's part, left-hand lighting must be arranged for as far as possible, exactly as in the rules for window lighting.

(3) In calculating the area over which the rays of a lamp will extend, we must only take into our valuation those rays which proceed from lamps in front of the class to the back of the class. Lamps in front of a class illuminate to some degree the desks of the back row; but lamps to the back of the class do not help to illuminate the front rows of desks when the children are in their places.

(4) There must be a clearance of 6 ft. 6 in. beneath pendants, and the luminous mantle must be as closely as possible approximated to this level. Hence burners must be short and cocks or bye-pass fittings must be placed on one side of the pendant arms, and not between the burner and pendant.

From suggestions Nos. 2 and 3, it will follow that the main desk lighting will be arranged to come from the left, and somewhat in front of the child. The gas-fitter should mark the position of the first lamp to be hung over the centre of the first dual desk on the child's left of the front row. Proceeding, lamp positions should be marked out along this front row at from 6 feet to 9 feet intervals, according to the height of the desks from the floor; being closer in infants, and further apart in the higher standards. The row of lamps thus marked out would give sufficient light for the front row and the second row of desks. A second row of lamps similarly spaced would light the third and fourth rows of desks. Since a lamp hung behind a child throws no light on the desk of that child, it follows that the space between the lamps from front to back of a room should be less than that between the lamps from side to side of the room.

The illumination of the teachers' portion of the class-room must be taken separately. Here are hung maps, charts, and the blackboard. Blackboards or slates should be fixed against the wall with the right hand slightly tilted forward. They should always occupy the right-hand half of the wall behind the teacher. For illumination, when daylight fails, a pendant should be hung to the left of the teacher's desk; and this light should be fitted with a chimney and a metal shell-shaped reflector, opaque to light, to project the light well on to the blackboard or master's desk as required and to present a dark back to the children.

Electric Lighting.—Handiness, simplicity, and ease of distributing points of light, complete absence of shadows below the lamp, the possibility of perfect reflection, healthiness in freedom from consumption of air and noiselessness, make lighting by the electric glow lamp one of the most perfect means now available for school use. The question of cost is not one that need be discussed. A carefully worked out comparison between the best form of gas illumination and the best metal filament electric illumination is still required. There are such returns; but what the author suggests is desirable is such a return by a public authority based upon the working of two similarly situated schools over a long period. Further, as a corollary to these returns, there ought to be a return of the relative cost of upkeep in decorations in the two schools.

The recent rapid development of the metallic filament lamp has somewhat disordered the arrangements for electric lighting in homes and schools. Comparing the lighting effects in two hospitals at which he works, he said that in one the voltage has been reduced to 25, and, with metallic lamps, the effect is perfect in flexibility and softness; in the other, a 240 continuous current is irreducible, and the lighting is hard, fatiguing, and wasteful.

In school rooms, the distribution of the lamps should follow the lines indicated for the gas-pendants. Beginning at the left hand of the children's portion of the class-room, a lamp should be hung over the centre of the first dual desk, and from there across the breadth of the room at distances of not less than 6 feet, and not more than 9 feet for 16-candle power lamps with 90° shades. With gas, the fewest possible number of burners is desirable, for the more burners the worse the atmosphere; but with electricity, the points of light may with advantage be more generously disposed, and a cross room spacing of 6 feet might be uniformly arranged. A second row of lamps should be hung in the same relation over the third row of desks. The lamps, as usually hung, err in being hung too far back—for instance, over a back row of desks, with the idea of their illuminating the desks in front, which they, however, fail to do when the children are present in their seats. The use of a front row of lamps with tilting shades, to light the blackboard in the teachers' section of the room, or desks in the children's portion, fails to serve both purposes in practice. It would be better to use a lamp to illuminate the desk and blackboard, and completely shaded from the children's portion of the room.

Refraction of Light.—There are on the market now a number of excellent devices in globes and shades which aim at the bending of the light rays by prismatic glass. Examples of these were experimented with—*e.g.*, prismatic bowls for gas-lights and Holophanes for electric light. The prismatic bowl is most satisfactory, particularly when a flat opal sheet rested upon the open mouth of the bowl. The Holophane productions are very satisfactory with electric light.

Indirect illumination by reflection has been highly recommended as affording the most perfect and natural mode of illumination. One reads of its adoption in some of the newer German schools. Of its use in work-rooms, where continuous and detailed work at the desk is required, the author's experience is unfavourable. The system was adopted in the New Anatomical Laboratories of Cambridge University some fifteen years ago; but it had to be superseded by direct glow-lamp illumination.

Discussion.

The discussion on this occasion really contained few points for us to note; but at the next meeting there will be members who will speak from the lighting engineer's point of view. Mr. J. S. Dow gave an account of some investigations that he had made at the request of Mr. Gaster of the illumination in school rooms. He found the illumination at Haverstock Hill School, with electric light, and at the Islington (Richard Street) Schools, with gas light, was good. The illumination of the Islington School by gas was very similar to the electric lighting at the Haverstock Hill School. The illumination readings obtained were as shown in the following table.

School.	Illumination in Foot-Candles.		
	Lecture Theatre.	Desks.	Blackboard
Haverstock Hill class room (electric)	—	2-2·5	3·5
Charing Cross Road (electric)			
Class room	2·5	1·6-30	1·2-2·5
Cookery room	0·75-1·6	1·7-2·5	0·8
Laundry	1·8 -2·6	0 9-1·8	0·5
Richard Street, Islington (gas)			
Class room	—	1·8-4·5	0 8-2
,,	—	2·2-3·0	3·5-3·9
,, (Needlework)	—	2·5-3·0	2-3
		Work Tables.	
Arts and Crafts School (electric) room—			
Jewellers	—	18-28	—
Wood carving	—	30	—
Architecture	—	7	3
Silversmiths	—	4·5	—
Art	—	6·5	—
Bookbinding	—	8·0	—
Compositors	—	4 9	—

He remarked that it should be laid down in schools that the source of light should never be visible to the eye. As to the quantity of illumination, in ordinary schools the practice appeared to show that 2 foot-candles was considered about right. The illumination on the desks should not be less than this; but for special purposes, such as needlework, shorthand, and so on, more was wanted, and a higher standard should be prescribed.

Then Dr. Clay, Principal of the Northern Polytechnic, from his experience with inverted arc lighting, said that a great deal of light was lost by it; and it was a most extravagant form of lighting. They could do better with metallic filament lamps. He had been rather amused at what Dr. Harman had said about the comparative values of the inverted and the upright incandescent gas-burner. The inverted burner, the author said, had only the one advantage that it gave a shadowless light underneath. Then he stated that there were three disadvantages for the upright burner, which made four advantages for the inverted burner. [Laughter.] In his (Dr. Clay's) own house, he had incandescent gas-lights. First he had the upright form, and then the inverted. The latter seemed to be much better than the former. With the latter, he had found that by removing the inner glass the mantles lasted very much longer. Mr. Baker, of the London County Council Schools, was the next speaker. In his opinion, owing to the variety of schools and conditions with which they had to deal, one standard of illumination would not do—some of the rooms being used for several purposes. The ordinary school class-room lighting was really worth little to anybody, as neither the gas company nor the electric light company could get much out of it. It was in the evening technical schools where the problem became difficult; and there they must have one kind of lighting which at all times was economical and suitable to all purposes. In lighting schools, consideration had to be given to prime cost; and if a large number of small units was put up, the first cost was going to be so high that people would not have it. During the last five years, they had had to undertake the lighting of quite a large number of schools. The system at present adopted was four lamps of 50-candle power; and for a school accommodating 900 children, this came to about £300. The total candle power installed was 7500; the price per candle power installed was 10·2d.; and the candle power per child per place was about 8—actually 7¾ candles. On these figures, the illumination required was about 7 million candles to light up the County Council Schools at the present time. In the night schools, where there was dressmaking going on, 5 or 6 foot-candles was the illumination needed; but 2 foot-candles answered quite well for desk work.

Mr. Waldram spoke on the subject of the daylight illumination of school rooms; and Mr. Kenelm Edgcumbe gave some information regarding illumination photometers. Other speakers connected with school work followed; and there were expressions of gratification that the matter of the illumination of school rooms was being taken up in a scientific manner.

The discussion will be continued on March 14.

Personal.

Mr. JAMES G. PRICE, the Manager of the Neston and Parkgate Gas Company, has been appointed Secretary of the Company, in place of the late Mr. G. E. Saville.

We learn from the report of the Directors of the Chichester Gas Company to be presented at the half-yearly general meeting to-day that, owing to advancing years and increasing physical disability, Mr. ALFRED LASS, who has been Chairman of the Company for the past twenty-one years, has retired from the Board; and that the vacant seat has been filled by the election of Mr. JOSEPH CASH, M.Inst.C.E. The Directors express their great regret at making the announcement, as Mr. Lass has, they say, "ungrudgingly devoted his best energies in the services of the Company."

SEALING HYDRAULIC MAINS.

A patent has been taken out by the Dessau Vertical Retort Company for a device for sealing hydraulic mains by means of the products of the condensation of gas. The English specification has not yet been issued, but the French one has lately been published; and the following particulars in regard to the appliance, with the accompanying illustrations, are taken from it.

A portion of the condensing plant above the hydraulic main is so constructed as to form a collector of the products of condensation. It is connected by a return-pipe with the hydraulic main in such a way that these products may, as required, be brought back into the main in order to raise the level of the liquid seal.

In the illustrations, fig. 1 is a sectional elevation of the arrangement; fig. 2, an end view, partly in section; while fig. 3 shows the upper part of another form of appliance, also partly in section, for effecting the object indicated.

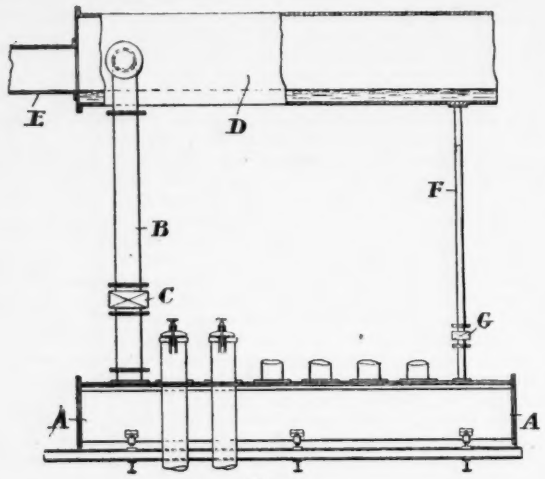


Fig. 1.

In the arrangement shown in figs. 1 and 2, the hydraulic main A, into the sealing liquid in which the ends of the ascension-pipes dip in the usual way, is connected by means of the pipe B, which can be closed by the silde-valve C, with an enlargement D of the foul main E. From the lower part of the chamber thus formed, a return-pipe F makes a connection with the hydraulic main; and it can be isolated by means of the closing device G. Through this pipe the condensation products in the chamber D, which acts both as a collector and a cooler, can be conveyed into the hydraulic main to raise the level of the liquid therein, as required. In plant as generally constructed, the arrangement is preferably that represented in fig. 3, in which a portion of the foul main is converted, by means of baffle-plates H, into a collector, whence the condensation products may be returned by the pipe F into the hydraulic main.

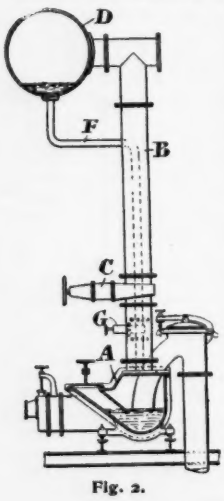


Fig. 2.

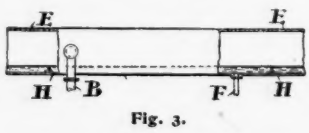


Fig. 3.

The advantages claimed for the arrangement are: (1) It is not necessary to pump to a considerable height the liquid which is to serve as the seal for the dip-pipes in the hydraulic main, nor to have a special reserve tank to contain it; hence economy in installation and saving in labour can be effected. (2) As the condensation products are themselves utilized as the sealing liquid, there is no dilution of the ammoniacal liquor in the hydraulic main, as is the case when water is employed. (3) The continual passing into the hydraulic main of quantities of very liquid hot tar, which is precipitated in the foul main, has the effect of keeping the former clear, and preventing troublesome deposits of thick tar.

Vertical Retorts at Glasgow.—As will be seen from some remarks recently made by Mr. Alexander Wilson (as reported elsewhere to-day, p. 524), the Works Committee of the Glasgow Gas Commission have sanctioned an installation of 744 of his vertical retorts at the Temple Gas-Works—capable of producing between 4 and 5 million cubic feet of gas per day.

LOWERING A GASHOLDER-TANK BOTTOM.

The bottom of the tank for the new Kingsbridge gasholder of the Consolidated Gas Company of New York was successfully lowered on the 6th ult. The following particulars in regard to the operation are taken from "Engineering Record."

The holder in question is to be of 10 million cubic feet capacity, and is being constructed near the New York Central and Hudson River Railroad, on the bank of the Harlem River, beneath which, as recently recorded in the "JOURNAL" [see *ante*, p. 221], some large mains have been laid. The tank in which the holder will work will be 251 ft. 3 in. diameter and 46 ft. 4 in. deep; and it is composed of riveted steel plates. The bottom is built of $\frac{3}{4}$-inch lap-riveted plates, except in the outer annular course, where the metal is $\frac{5}{8}$ inch thick; and double-riveted butt-strap joints are used. Round the rim is an 8 in. by 8 in. by $1\frac{1}{8}$ in. angle curb for connecting the bottom and the first course of wall plates. The bottom of the tank rests on a level foundation of concrete; and since it would be impossible to rivet the plates together when lying upon the foundation while being assembled, they are supported on blocks 30 inches high. When the riveting is completed and the angle curb and the angles for attaching the interior permanent frame to the bottom are in place, the blocks are removed, and the plate lowered slowly to its foundation.

The lowering apparatus consisted of 184 jack-screws distributed round the rim, and at 15 ft. by 20 ft. intervals over the entire bottom. The screws were 2 inches diameter and of No. 6 pitch. Two different styles were used; the screws round the rim differing from those inside. The latter were passed through 7-inch round holes cut in the bottom plate, and bore on a 6-inch circular plate resting upon the concrete foundation. Round the screw, about 18 inches above the bottom plate, was a threaded collar or nut, from which were hung two 2 in. by $\frac{1}{4}$ in. steel straps. Their lower ends were bolted to short pieces of 3 in. by 3 in. by $\frac{3}{8}$ in. angles riveted to the plate; so that the entire bottom was suspended by means of these collars and steel straps from the jacks. On top of each jack was a cross-piece for receiving a capstan bar. With this type of jack, the nut, but not the screw itself, is lowered. In the jacks used round the rim, on the contrary, the screw travels downward, and the body or frame and the nut do not change in elevation. These jacks consist of a frame standing clear of the rim itself, and carrying a foot, attached to the lower end of the screw, projecting underneath, and thus supporting the edge of the bottom plate. The screw and, consequently, the foot are lowered by turning a heavy nut bearing on top of the jack frame.

When all the riveting is completed, the jack-screws are set and given a few turns to raise the bottom sufficiently to release the blocking, which is then removed. All dirt and *débris* are removed from the concrete surface, and over it is spread a bed of sand and portland cement mixed dry. This layer is $1\frac{1}{2}$ inches deep, and affords a bed into which the rivet heads on the bottom of the plate can sink.

Each jack is then manned by one man, and the capstan bars are all set parallel and pointing in the same direction. At the striking of a bell, each bar is turned through half-a-revolution; thus placing them again in the same lines, but pointing in the opposite direction. It is thus very easy for the six or seven foremen who direct the operation to tell at a glance whether or not each man has turned his screw through half-a-revolution. The intention, however, is so evident that no difficulty is found; and with practically no instruction the men align the bars of their own accord. As soon as the foremen are assured that everything is in proper order, another half-turn is made, and the work thus continued until the bottom is home.

Throughout the lowering, careful watch is kept on the jacks; and as soon as one is found out of plumb, operations are discontinued till it has been slacked off, straightened, and screwed up again to the height of the other jacks. When the bottom is finally down, the jacks and foot-plates are removed, water to hydrate the dry mixture of sand and cement is run into the jack holes, and these are closed by covers held by tap bolts, holes for which are punched and reamered before the lowering is started.

The tank is being built under the supervision of Mr. W. H. Bradley, the Chief Engineer, and Mr. W. Cullen Morris, the Construction Engineer, of the Company. The Contractors are the Bartlett-Hayward Company, of Baltimore.

Institution of Mechanical Engineers.—In the report presented by the Council of the Institution at the sixty-fourth annual general meeting last Friday, they stated that the total membership at the close of the past year was 5700, compared with 5583 at the end of 1909. There were 465 additions to, and 348 deductions from, the roll during the year; making a net increase of 117. The total revenue was £15,625, and the expenditure £12,734; leaving a balance of revenue over expenditure of £2369, exclusive of entrance fees and life compositions carried direct to the capital account. The second award of the "Water Arbitration Prize" has been made to Mr. William Rawkine Eckart, an associate member of the Institution, for his paper on "The Application of the Pitot Tube to the Testing of Impulse Water-Wheels." This prize is awarded biennially; and the third award will be made in February, 1913, for the best paper dealing with new investigations of hydraulics, or recent developments in the application of water power.

REGISTER OF PATENTS.

Discharging and Charging Gas-Retorts.

West, J., of Southport.

No. 1534 ; Jan. 20, 1910. No. 7344 ; March 23, 1910.

This combined invention relates to a machine for discharging the coke from, and charging coal to, gas-retorts. It has for its object improvements in the ram-type of discharging machine constructed according to patent No. 7288 of 1904 ; and the invention also relates to the application of a portion of the discharging and charging apparatus, so that the machine may be used for charging only without regard to the discharging.

The apparatus described in the patent of 1904 was applied solely for the purpose of discharging the coke by pushing it through the retorts. According to the present invention, the machine then described is modified in such manner that it will also charge the empty retort by pushing the coal forward into the retort ; the coal being fed to the front of the head from a hopper supply, and pushed through a trough or bridge placed between the charging machine and the retort—the coal being pushed forward by successive strokes until the whole retort is completely charged. Assuming that the retort is of the usual length—say, 20 feet through—the apparatus may be used to first discharge the coke by pushing it through the retort and then afterwards charge it with coal. But if the retort is stopped in the centre, the invention also covers the charging of half the length of the retort in one operation (and requiring a machine on each side of the retort-bench to accomplish the work), and the discharging of the coke from the retort would then be accomplished by separate discharging machines.

In a machine arranged for first discharging the coke from a through retort and afterwards charging it with coal, the patentee provides a travelling trolley fitted with a coal-hopper to contain the supply of coal for charging the retort, and the mechanism for adjusting the ram discharging and charging apparatus to the level of the retort to be operated on. The coal-hopper of the machine is provided with a slide-door or valve, which is opened when supplying the coal to the charging apparatus and closed when the machine is used for discharging the coke.

In this form of the machine, there is provided below the coal-hopper a trough of the same section at one end as the retort (but smaller), to enable it to enter the retort mouthpiece and form a connection with the retort and the machine, and through which the coal, after being fed to this trough, is pushed by the ram-head into the retort. After this operation, the continued motion of the ram-head pushes the coal along the retort to the desired distance—first carrying a portion of the coal to the farthest end of the retort, and then in successive strokes, each time taking a further supply of coal, until the retort is completely charged.

In a machine arranged for charging the coal to one-half the length of a through retort, to accomplish this in one stroke, instead of by successive strokes, the proposal is to dispense with the use of the ram for discharging the coke from the retort prior to it being charged by the same machine, and perform the operation by a separate machine. The ram is, however, retained for the purpose of pushing the coal into the retort, and is preferably constructed with longer projecting side-pieces than with the charger which places the coal in the retort by a succession of strokes. These serve the purpose of preventing the body of coal, while being pushed along the floor of the retort, from buckling up ; the position or height of the pieces from the floor of the retort also determining the thickness of the charge of coal in the retort. The side-pieces are preferably curved inwards somewhat to the shape of the retort, and leaving a more or less open top.

The ram-head slides over a shallow trough that guides the head into the retort and serves, together with the side-pieces, to receive the coal from the hopper. When the ram-head moves forward, the coal is pushed into the retort and along the bottom of it.

In the case of a machine to only charge the retort, the ram-head and

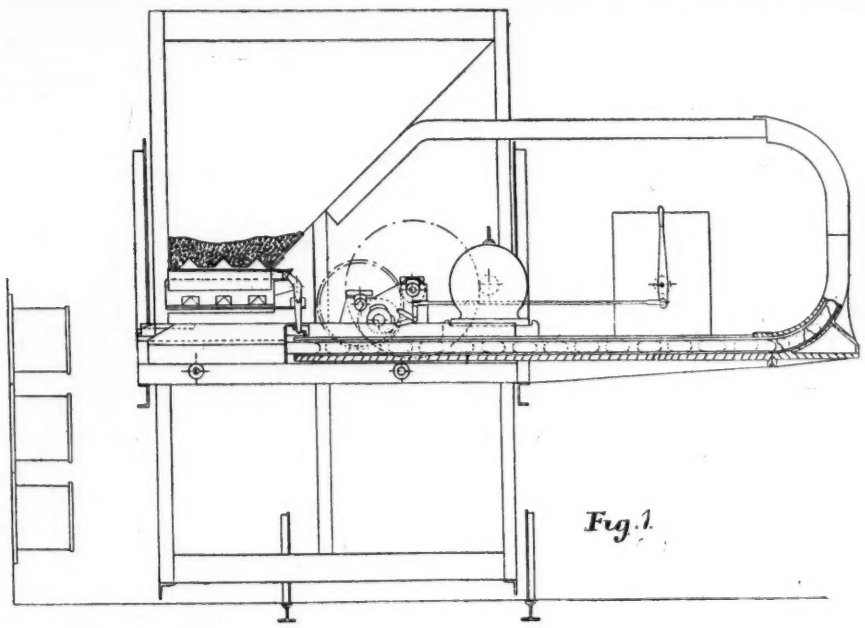


Fig. 1.

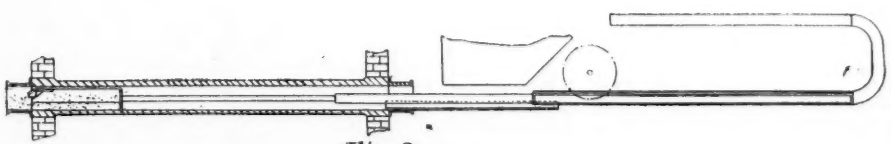


Fig. 2.

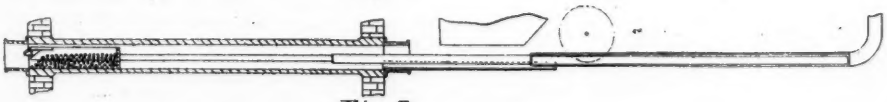


Fig. 3.

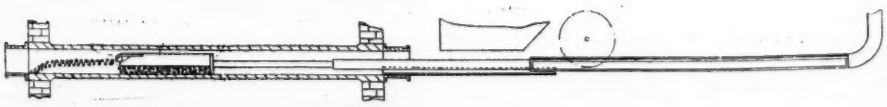


Fig. 4.

Fig. 5.

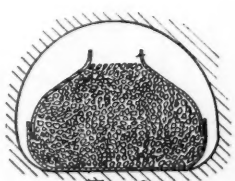


Fig. 6.

Fig. 7.

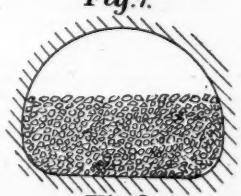


Fig. 8.

West's Retort Discharger-Charger.

extension pieces are attached to a back carriage, which will run in the framework of the charging machine.

In order to level the coal during the return stroke of the charger to the machine, the front or entering portion of the charger is fitted with a vertically adjustable V-shaped strickling plate.

Fig. 1 is a side elevation of a machine for discharging the coke through a through retort and charging it with coal by entering the retort a sufficient number of times until it is completely charged. Fig. 2 shows the ram entering the retort and discharging the coke. Fig. 3 shows the ram placing the first portion of the charge of coal at the far end of the retort. Fig. 4 shows the ram placing the second portion which joins on to the first. Fig. 5 shows the charge completed by the ram having entered the retort four times to complete the charge (although the machine may be arranged to do this in more or less number entries, as convenient, to suit the length of the retort). Fig. 6 shows the section of the extension pieces which are fixed in front of the ram-head, and also shows the bottom trough, which forms a bridge between the machine and the retort, and over which the coal is pushed when entering the retort. Fig. 7 is similar to fig. 6, but shows the additional extension pieces which are necessary when the machine is for operating on stop-ended retorts. Fig. 8 shows the layer of coal in the retort, which may be of any suitable profile or section.

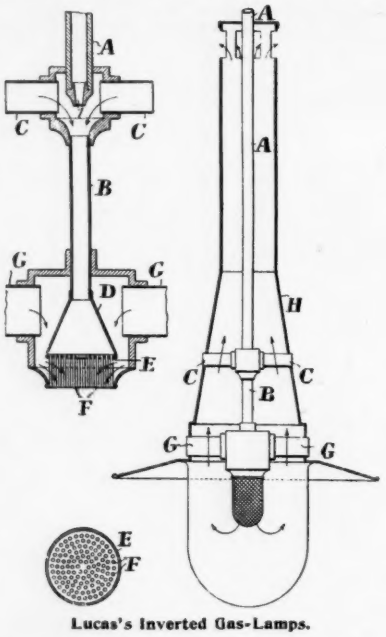
Inverted Incandescent Gas-Lamps.

LUCAS, P., of Südende, Germany.

No. 2181; Jan. 28, 1910.

This invention relates to inverted incandescent gas-lamps using gas at an ordinary pressure, and has for its object "to obtain high intensities of light without the use of motors or compressing apparatus for the supply of the mixture of gas and air, and at the same time to obtain a lamp which is in no way liable to light-back."

The patentee says that where it is necessary to illuminate a long depending mantle throughout its entire length, experiment has shown that it is essential for the speed at which the secondary air escapes to be accelerated. To this end, the casing through which the air is drawn is restricted at its lower end where it terminates flush with the bottom of the burner tubes, so that the secondary air escapes at a high speed; thus causing ignition to take place at the mouth of the small burner tubes without overheating them.



Lucas's Inverted Gas-Lamps.

A vertical longitudinal and cross section of the burner are given; also a section of an incandescent gas-lamp provided with the burner.

The gas from the nozzle of the supply pipe A passes at ordinary pressure into the mixing-pipe B, connected to the supply pipe by a casing, into which open two lateral air-supply pipes C, through which the gas escaping from the nozzle draws and carries with it a small quantity of air (for instance, one part of air to one part of gas). This mixture passes through the pipe B into the chamber D formed at its lower end and opening into the burner E, which is directed downwards. The burner comprises a large number of adjacent pipes F with spaces between them. The chamber D and the burner E are surrounded by an annular casing into which open laterally the pipes G for supplying the additional air. These pipes are held by the lamp casing which carries the lamp glass and the reflector. On the casing is placed a chimney or draught pipe H, which in cross section considerably exceeds that of the burner. The upper end of the chimney is connected to the gas-supply pipe and provided with outlet openings for the combustion gases.

The additional air is drawn in through the pipes G by the mixture of air and gas escaping at the lower end of the pipes F, owing to the action of the chimney H; the incoming air passing in the direction of the arrows downwards through the spaces between the burner pipes, where it is supplied to the flame "in an exceedingly finely divided state."

Lighting-back of the flame is thus impossible, as the mixture of gas and air escaping from the mouth of the tubes of the burner is non-explosive; and an additional quantity of air which is required for its complete combustion is supplied only at this point.

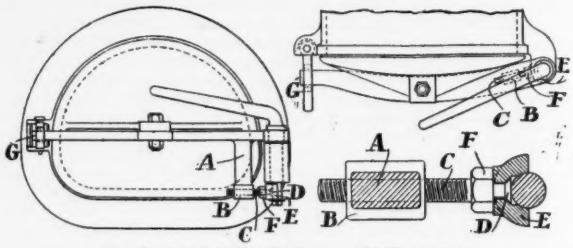
Retort-Lid Fastenings.

LANGFORD, P. N., and SHILTON, W. A., of Coventry.

No. 3548; Feb. 14, 1910.

The patentees propose that in a gas-retort mouthpiece having a crossbar capable of vertical adjustment, the lower horizontal member of the crossbar fork should be made adjustable in length by means of a screwed pin, whereby the crossbar may be readily raised or lowered vertically relative to the mouthpiece.

The retort mouthpiece shown consists of a ∩-shaped body having a lid carried by a crossbar, pivoted at one end in a lug, formed integral with the mouthpiece body and the other end engaging with pivoted slotted catches. When it is desired to close the mouthpiece, the lid is finally tightened by rotating the eccentric hinge pin by the lever in the usual manner.



Langford and Shilton's Retort-Lid Fastening.

In our present invention, the lower horizontal member of the crossbar fork is made adjustable in length in the following manner. The vertical portion A of the L-shaped arm extending from the main horizontal member of the crossbar is formed with a boss B, at its lower end drilled and tapped; and the horizontal portion of the L-shaped arm consists of a screwed pin C, one end of which passes through the boss and the other end having a countersunk head D turning freely in a grooved heel piece, which bears against, and turns on, the lower end of the eccentric hinge pin. A portion of the screwed pin C is formed square or hexagonal at F, solid with the pin for the purpose of turning it. When from wear in the hinge or other portions the crossbar carrying the lid droops, the end G is readily adjusted vertically as desired, to come into line with the pivoted slotted catch, by simply turning the screwed pin C, and so lengthening the lower horizontal member of the crossbar fork.

Recovering Waste Heat from Gas-Fires.

VALENTINE, H. S., of Stirling.

No. 3791; Feb. 16, 1910.

As the outcome of a recent series of extensive tests carried out on gas-fires by competent gas engineers, the patentee points out that it has been found that an average of about 30 per cent. of the heat generated is carried off by the flue—a "percentage much greater than is necessary to maintain sufficient draught to effectively carry off the waste products of combustion."

To reclaim a considerable portion of this waste heat, and return it to the room, he proposes to cause the heated gases as, or immediately before, they enter the flue or chimney, to pass through a heat-trapping and air-throttling device, "so that the dilution of the products of combustion by the inrush of cool air from the room shall be reduced to a minimum, and at the same time the obstructed heat shall be suitably radiated back into the room"—thus tending to increase, rather than diminish, the "pull" of the chimney, and correspondingly reducing the quantity of cold air entering the room and enhancing the heating value of the fire.

The "heat-trapping" device consists of a brick of fire-clay or other suitable material, the surface of which has a series of perforations or slots suitably arranged above the fire; so that the gases, as they escape to the chimney, must pass through the perforations or slots, and, in passing, give up a considerable portion of their heat. The under surface of the brick is preferably set at such an angle that it radiates the heat as it receives it backward and downward into the room. The combined area of the perforations is such as "to comfortably carry off the whole of the waste products of combustion along with only a small and necessary proportion of air from the room." On first lighting up, it may be desirable (he points out) to increase the amount of opening so as to ensure that the waste gases find their way freely into the chimney; but when once heated up, the excess opening may be cut off. The additional opening may be obtained by means of an ordinary swinging canopy (such as is used in coal-fires), which, when closed, shall deviate the entire flow of the gases through the perforations or slots.

Gas-Stoves.

PREEN, A. H., of Cricklewood, N.W.

No. 7113; March 22, 1910.

This is a combination gas-fire which may be used alone or as an apparatus devised to light, without other fuel, an ordinary coke or coal fire, and is so constructed that the orifices, admitting the gas flames, cannot become choked with ashes or coal dust.

The stove is made to fit in front of the ordinary fire place or grate, or to take the place of it. It consists of an iron plate which has on the face grooves or corrugations, also small studs or nipples for radiating the heat. The orifices for the bunsen gas-flames are preferably at the top of the plate, so that all the flames shoot down to the bottom of the plate "enveloping the grooves and nipples in flame," and are arranged vertically so as to prevent them becoming choked with ashes or coal

dust. At the back of the plate are the gas-jet and mixing-chamber, which are arranged with a free draught of air, so that the mixing-chamber will not become too hot.

When the gas is first lighted, the studs and corrugations become red hot—thus radiating the heat as a gas-fire; but if it is desired to light a coal or coke fire, the fuel is placed in the grate covering up the front of the stove, and the flames play on the fuel and light it, after which the gas is turned off.

Incandescent Mantles.

WILLIAMS, A. H., of Hyde Park, South Australia.

No. 11,459; May 9, 1910.

This improvement in the making of incandescent mantles is to render them elastic and tough and practically immune from breakage, either in transit or after being lit upon the burner for the first time, the "invention" consisting in improved combinations of ingredients and an improved method of treating the mantle with such ingredients whereby it "is rendered more tough and elastic and the candle power of the light is increased to an appreciable extent."

According to the invention, the impregnated "stocking," after being prepared as heretofore (including the burning off), is treated as follows: It is first dipped for two minutes in a bath of petroleum oil, and then dried for three minutes in an oven or drying chamber maintained at a temperature of about 80° Fahr. It is then dipped for five seconds in a mixture of collodion, alcohol (or rectified spirit), olive oil, and spirits of camphor in about the following proportions:—

Collodion	5 oz.
Alcohol	1½ ,,
Olive oil	½ ,,
Spirits of camphor	⅛ ,,

and again dried for ten minutes in a chamber at about 80° Fahr. It is then dipped for five seconds in a solution of gelatine in the proportion of ¼ oz. gelatine to 11 oz. of water, and again dried for about ten minutes (or until thoroughly dried) in a drying chamber at about 80° Fahr. The gelatine solution, after preparation, must be cooled down to, and maintained at, a temperature of 105° Fahr. It is then packed, and is ready for sale. The above sequence of operations, the patentee says, he has found the most satisfactory method of treating the stocking; but he has obtained good results by using the olive oil in the first bath instead of the second, in which case the olive oil and the petroleum oil are mixed in the proportion of one part of olive oil to ten parts of petroleum oil. The second mixture is the same as above, except that the olive oil is omitted therefrom.

Gas-Purifiers.

SCOTT, J. B., of Cowdenbeath, N.B.

No. 12,296; May 19, 1910.

This invention relates to gas-purifiers with side doors to allow of the removal of the purifying material with a minimum of labour, and which will allow of the employment of a minimum of interconnecting pipes. A further object is to provide a construction which shall be capable of ready enlargement and extension.

In the arrangement shown, there are two purifiers with further purifiers indicated in dotted lines. Each purifier-box is provided with a manhole at E, and a removable side door for access to the interior at F. The gas-ducts H, with valves I, pass over the purifiers and communicate by co-acting with perforations in the roof. The inlet pipes act as supporting columns as at J; being serrated at K to allow of the entry of the gas. Condensation may be drained off by water-traps L.

The purifier is discharged and recharged by removing the side door. The construction is preferably of such height as to allow of the workman standing upright within the chamber—say, about 6 feet in internal height; and the advantages of the construction shown will, it is said, be appreciated by a comparison of the present purifier and its method of use with that of the usual gas-works purifiers and their methods of employment. "In these forms, it is customary to provide heavy covers to the purifiers, which are connected thereto by a plurality of wing-nuts, which, when it is desired to have access for discharging and charging, have first to be removed and then the lid lifted from the purifier by a crane or other lifting tackle carried on a gallery over the purifier. These operations, which are more usually difficult owing to the parts having been exposed to the atmosphere for considerable periods, and entail much labour, are avoided in purifiers according to the present invention. Heretofore it has further been customary to construct the purifiers partly below the ground level, and to place the ducts around them either above the ground or sunk in pits—giving rise to difficulties as regards access to the parts for inspection or repair. According to the present invention, there are no removable covers, and the peripheral arrangement of the ducts may be avoided; giving freer access to the parts and materially reducing the lengths of the interconnecting ducts required to be employed. Further, where the purifiers are entirely above ground and the ducts above the same, extensions of the purifier systems are relatively easy, and the purifiers may be placed in contact one with another, or in other compact arrangements."

Again, it has been customary heretofore to discharge and recharge purifiers by a mechanical device or by hand labour; but the former has only been adapted for employment in relatively large works—smaller works of necessity employing hand labour. In the latter case, overhead tackle has been employed to remove the cover of the purifiers, which were more usually half under the ground level; and the operator then descended into the purifier to throw the material upwards and outwards into a suitable receptacle for removing it to the revivifying ground—operations requiring an expenditure of a considerable amount of energy. In charging, the material has been tipped in from above and then shovelled in position—a double operation, entailing loss of energy and resulting in a packing of the material as the result of tipping. According to the present invention, a two-wheeled charging truck can be placed right inside the purifier, and the material shovelled into position at one operation; the filling commencing at the back, and the operator bringing the whole number of layers with him forward to the front and finishing off at the door. Further, it will be impossible for the operator to dump the material and thus to produce packing of it. Besides, the grids, as removed when discharging the material, could be stored at the side without the necessity of lifting them from the box.

In order that the material may be banked closely against the door, so that no free passage for the gas may be formed, the door is made in several sections—for example, as many sections as there are layers, finishing off the last grid of each layer, and fixing the section of door corresponding to it before commencing the next; the last one being finished from the manhole at the top. Similarly the sections could be combined to form one door by connecting them by rubber joints or equivalents.

Inflammable Spirit for Use in Internal Combustion Engines or in the Manufacture of Illuminating Gas.

HIGGINS, W., of Putney, S.W., and KEMP, G. H., of Islington, N.

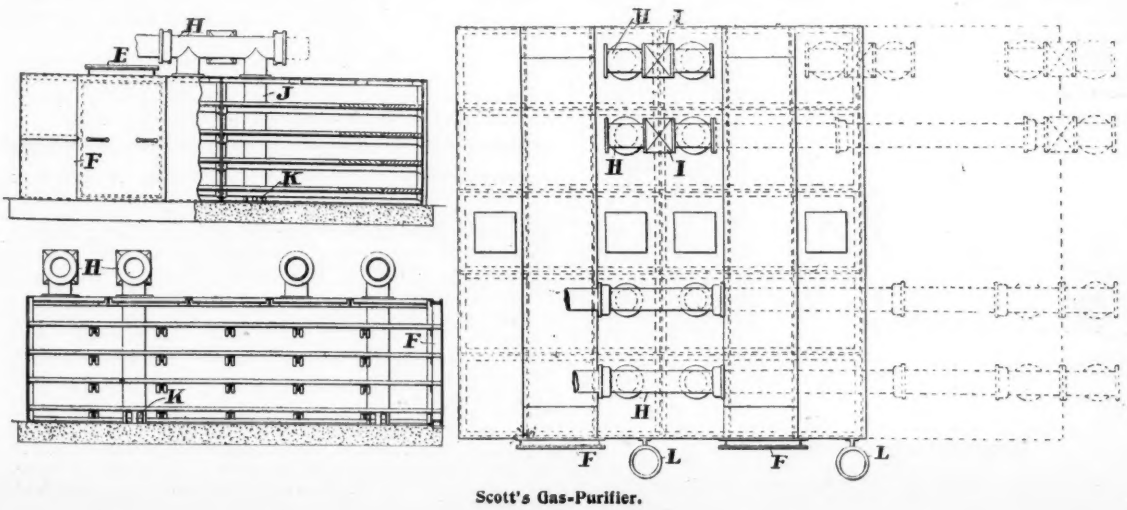
No. 25,739; Nov. 5, 1910.

This invention relates to the manufacture of a fuel for internal combustion engines and illuminating gas, and has for its object "to produce a cheap and highly mobile spirit and at the same time a spirit which does not foul the engine or sparking-plugs on combustion while giving at the same time increased power."

The invention consists in (1) A motor spirit containing coal tar or like benzol, gasoline or pentane, and a small proportion of carbon bisulphide; (2) a motor spirit containing from about 70 to 90 per cent. of benzol, from about 30 to 8 per cent. of gasoline or pentane, and a small proportion of carbon bisulphide (say) about 2 per cent.; (3) the improved fuels described for use in internal combustion engines and for making illuminating gas.

Compounds containing benzol and a light hydrocarbon have already been proposed as fuel for motors; but the patentees state that they find that the spirit manufactured according to their invention can, on the one hand, be used in an ordinary carburettor adjusted as for petrol, while, on the other hand, under combustion it does not cause deposit in the cylinder—for example, sooting of the sparking-plugs and other parts—such as takes place when benzol is used after vaporization in a suitably adjusted carburettor. They have also found that, with a motor fuel according to their invention, the power of the engine is increased so that increased mileage per gallon can be obtained.

In carrying their invention into effect according to one modification, they make a mixture containing: Benzol, 73 per cent.; pentane, 25 per cent.; and carbon bisulphide, 2 per cent. But according to another



Scott's Gas-Purifier.

example, a suitable fuel may be obtained by making a mixture of: Benzol, 80 per cent.; gasoline, 18 per cent.; and carbon bisulphide, 2 per cent. A further example which is found to be suitable is: Benzol, 88 per cent.; gasoline, 10 per cent.; and carbon bisulphide, 2 per cent. By mixing the highly volatile light hydrocarbons, such as gasoline, of a specific gravity of about ·66, with benzol, and varying the proportions, a spirit of a specific gravity near that of petrol can be obtained; and they find that the use of carbon bisulphide in a very small proportion—so small that the calorific value of the fuel is not substantially diminished—assists in keeping the engine free from sooting and fouling.

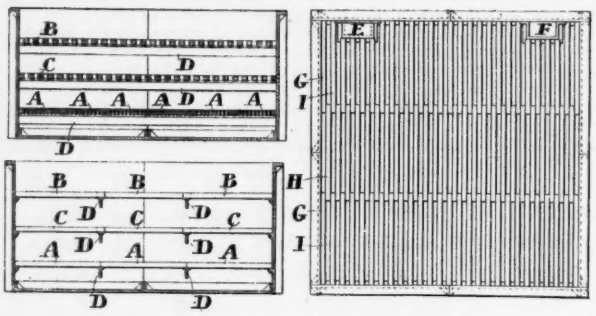
Gas-Purifiers.

R. Dempster and Sons, Limited, and Broadhead, J. W., of Elland.

No. 12,894; May 27, 1910.

This invention relates in particular to purifier grids which support the material through which the gas is passed.

According to the invention, the grids are composed of rows of loose wood bars laid upon the crossbars or bearers, the bars of one row overlapping those of the adjoining row or rows—say, approximately to the extent of the width of the bearer bars—in such manner that the ends of one row form distance-pieces for the next row. Bars of different widths may be used in the same purifier if desired, so that in one row the bars may be wider than the spaces, and in another row the spaces wider than the bars. The bars may be of any size and cross section; but "it is at present intended to employ bars of approximately square cross section and of rough and cheap timber. When not in use, such bars may be removed from the purifier and piled together in a much smaller space than that occupied by ordinary purifier grids."



Dempster and Broadhead's Purifier Grid Arrangement.

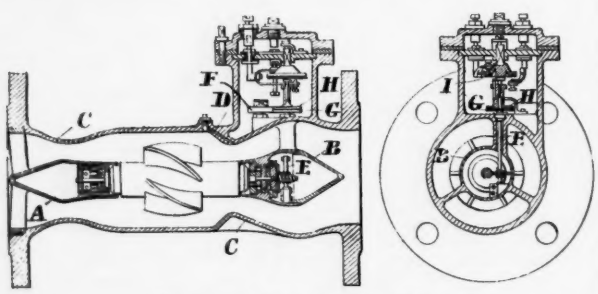
As shown, the lowest compartment is covered with ordinary grids A, while two tiers of bars B C, arranged according to the present invention, are used in the upper compartments, resting on the ordinary crossbars or bearers D. The purifier inlet and outlet are at E F. It will be observed in the first section that the bars B are laid above the spaces between the bars C. The bars G being laid as shown in the plan, and the bar H being then laid on the crossbars with its ends overlapping the inner ends of the bars G, the bar H acts as a spacing-piece, facilitating the laying of the next bars I at the correct distance from the bars G.

Meters for Liquids.

Siemens Brothers and Co., Limited; a communication from Siemens and Halske Aktiengesellschaft, of Berlin.

No. 24,159; Oct. 18, 1910.

This invention relates to water-meters of the type in which a spindle carrying inclined blades of known construction rotates at a speed depending upon the flow of liquid to be metered; the registering apparatus being driven by the revolution of the blades through intermediate gearing. In such arrangements, it is essential for the accuracy of the registration, the patentees point out, that the flow of liquid to the blades shall be uniform at all parts of the cross section of the flow, in spite of the obstruction due to the bearings supporting the spindle of the blades and the arms connecting the frame of the bearings to the casing. The present invention uses for this purpose "the known principle that an acceleration of the velocity of flow of the liquid due to restricting the cross section of the flow tends to equalize the speed of flow at all parts of the cross section."



Siemens and Halske's Water-Meter.

In the arrangement shown, the spindle carrying the blades is supported by ball bearings in the frames A B, connected to the casing by arms. The frames are made in the shape of a double cone, and the casing is provided with two constrictions (of uniform cross section); the one in the path of the liquid before it encounters the blades being made in the same plane as the largest cross section of the double cone A. The largest cross section of this double cone, on the other hand, occurs behind the other constriction; so that the cross section diminished by this constriction increases only very gradually to its normal size. The part of the casing in which are the blades is connected by a small channel D with the most constricted part of the casing, so as to draw off any gases that may be liberated in the part of the casing where the blades revolve.

The rotation of the blades is transmitted by a worm and a worm wheel on a spindle E in such a way that the liquid has no access to the transmitting gear and the ball-bearings. For this purpose, the spindle is fitted within one of the arms for supporting the frame of the bearings. A broad spur wheel F gears both with the spur wheel G, fixed to the spindle E, and with another spur wheel H rotating freely on the spindle. The last named spur wheel has a larger number of teeth than the other one. The numbers may be, for example, 51 and 50 respectively; so that every revolution of the wheel G moves the wheel H one tooth relatively to the wheel G, so that fifty-one revolutions of it correspond to one revolution of the wheel H relative to G.

An arm is fitted to the spindle E, so that the arm and spindle turn together, but the arm is free to slide up and down the spindle. The free end of the arm rests on the hub of the wheel H, which hub is formed as an inclined disc; so that during half the revolution of the wheel the arm is raised by a certain amount on the spindle and depressed by the same amount during the other half of the revolution. In this way, one up-and-down motion is imparted to the arm for every fifty-one revolutions of the spindle E.

When the arm is in its highest position (as shown), it has raised a sliding piece I against a spring-control sufficiently to engage a contact and so close an electric circuit. Similarly in its lowest position, the slide touches an adjustable contact screw and completes another circuit. From the closed circuits, a register can be worked so as to record the total quantity of liquid flowing through the meter.

APPLICATIONS FOR LETTERS PATENT.

2941.—Meeze, A. G., "Producing heat-radiating flame and inflammable gases by fractionate combustion and apparatus therefor." Feb. 6.

2954.—Southey, A. W., "Generation of gaseous fuel." Feb. 6.

3019.—Lied, O. S., "Igniting and extinguishing gas-burners." Feb. 6.

3024.—Thuman, F., "Water-gas apparatus." A communication from C. S. Chrisman and J. H. Taussig. Feb. 6.

3026.—Skriwan, E., "Lamps and mantles." Feb. 6.

3036.—Willis, J., and Johnson, B., "Gas-proof electrical make-and-break contact or switch." Feb. 7.

3106.—Beldam, E. A. & W. R., "Joint-making packing." Feb. 7.

3109.—Lessing, R., and Gibbons Bros., Ltd., "Gas-purifying apparatus." Feb. 7.

3150.—Bleichert, M. & A., "Quenching and removing coke." Feb. 7.

3166.—M'Ewen, C. J., and Gibbons, G. B. A., "Cooling and utilizing the heat of coke or other material discharged from retorts or ovens." Feb. 8.

3172.—Crammond, C. T., and O'Callaghan, P. B., "Globes or chimneys for incandescent gas lighting." Feb. 8.

3179.—Brown, J. W., "Inverted burners." Feb. 8.

3189.—Stewarts and Lloyds, Ltd., and Stewart, J. G., "Faucet-end for wrought-iron and steel pipes and tubes." Feb. 8.

3243.—Kent, H. A., "Indicating high temperatures." Feb. 8.

3280.—Haughton, J. W., "Gas-engines." Feb. 9.

3310.—Vizet, A., and Gauthier, R., "Regulator for the admission of air to furnaces." Feb. 9.

3313.—Barker, E., "Automatically lighting and extinguishing gas-lamps." Feb. 9.

3380.—Louis, F., "Lighting fires by gas." Feb. 10.

3425.—Mathys, A. W., "Boxes for mantles." A communication from Front G. m. b. H. Feb. 10.

3435.—Thompson, W. P., "Producing gas from oil." A communication from O. H. Ensign. Feb. 10.

3518.—Bleichert, A., and Co., "Quenching and removing coke." Feb. 11.

3539.—Pradeau, H., and Ford, H., "Gas-generators." Feb. 11.

3540.—Hanwell, H. W., "Universal joints for gas-fittings." Feb. 11.

Restoration of Lapsed Patent.

An order was made on Feb. 10, 1911, restoring the letters patent granted to Cuthbert Burnett for "Improvements in apparatus for cooling, screening, and loading coke," No. 12,508 of 1905.

Additional Plant for the Tiverton Gas-Works.—At a meeting of the Tiverton Town Council on Monday last week, the Lighting Committee submitted a special report from the Gas Manager (Mr. Clark Jeffery) suggesting improvements at the gas-works, and recommending the purchase of a "Rapid" power charging-machine, at a cost of £295, and the installation of sulphate of ammonia plant, for £410. The recommendation was adopted.

New Joint-Stock Companies.—The Abernethy Gas Company, Limited, has been registered in Edinburgh with a capital of £1000, in £1 shares, to acquire the undertaking of the Abernethy Gaslight Company. In the "Journal" for the 7th inst. (p. 399) the registration of the Markyate and Titchfield Gas Companies was briefly noticed. The object of the former is to acquire the gas-works at Markyate, and manufacture and supply gas in Markyate or South Luton. The first Directors are Messrs. H. J. Martin, W. A. Schultz (Chairman), and H. C. Walker. Mr. Schultz is also Chairman of the Titchfield Gas Company, and the other gentlemen named, with Mr. H. King Hiller, are the first Directors.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Liverpool Corporation and the Standard Burner Bills.

SIR,—In commenting upon anything that I may have to say, from time to time, on this subject, I do expect you, as far as lies in your power, to combat, discount, and belittle my every statement; and so long as you employ reasonably fair methods in doing this, I do not object. But your comment in your last issue—viz., "We are not yet shown why the Liverpool Corporation are taking the trouble to ask for the use of the 'Metropolitan' No. 2 burner for testing Fazakerley gas," is to wilfully ignore explanations in my two previous letters.

I have taken pains to say, in your issue of the 7th inst., that the reason the Liverpool Corporation were applying for power to use the No. 2 "Metropolitan" argand was that they were competing with the Gas Company, as far as they were able, both in the matters of selling price and illuminating power; and, for this reason, they were applying to use the same test-burner that has been made statutory for the Liverpool Gas Company.

In my letter in your issue of last week, I stated that I had no objection to the No. 2 "Metropolitan" burner for testing gas where the quality was sufficiently high as not to employ the damper. Therefore, I say that my letters do clearly and distinctly explain why the Liverpool Corporation are making application to use the No. 2 "Metropolitan" argand.

With regard to the latter portion of your comments, where you say "But perhaps it is better not to say more, lest, on the evidence of Mr. Carr last session, the Corporation decide to abandon what is a very proper step in asking for authorization to use the new burner," I can only say that this is a display of egotism on your part, which even you, Sir, on reflection, may realize as being a bit below your usual form!

Widnes, Feb. 18, 1911. ISAAC CARR.

[Mr. Carr would not be in usual form if not constructive and original; but where he finds in the concluding words of the comment of a week ago anything that can be described as "a display of egotism" on our part, we entirely fail to see. If he reads the sentence again, he will see that it was "the evidence of Mr. Carr," and not anything that we might say, that it was feared might, if further reference was made to it, induce the Corporation to turn from what is generally considered to be the very proper path that they have now commenced to tread. We must therefore "on reflection," and with all deference to our correspondent, deny the applicability of the "display of egotism on our part." But it is better not to talk of "egotism" in view of the evidence adduced against the burner last session, and with the fact placed alongside it that the Liverpool Corporation are themselves, on someone's recommendation, now asking for the use of the burner. But reverting to the concluding words of the comment of last week, it may be admitted that it did not occur to us at the time of writing that perchance the evidence that did not persuade two Committees of Parliament last year might not now influence the Liverpool Corporation, in view of the fact that they haze now so fully the other side of the question before them, and the unanimous judgment of two Committees of Parliament. Granting, as has now been frequently done in these columns, the propriety of the Liverpool Corporation applying for the new burner, it can be left to the judgment of our readers whether, in view of the evidence of the opposition witnesses last session, mere competition with the Liverpool Gas Company in the matters of selling price and illuminating power is a sufficient reason for adopting the generally approved test-burner. A little hope had been indulged that higher grounds than this had had influence with the Corporation. In determining upon the adoption of the new burner for the purpose of enabling competition "both in the matters of selling price and illuminating power," Mr. Carr may be relied upon to have considered the possibility of the day arriving when, in furthering the competition as to price, there may be a reduction of illuminating power which would necessitate the damper being brought into play.—ED. J.G.L.]

Mr. Carr and the Standard Burner Bills.

SIR,—In a letter appearing in your issue of last week, Mr. Carpenter says that my statement—viz., that I had established a difference of 4·7 candles betwixt the No. 1 "London" and No. 2 "Metropolitan" burners at the Craven Street testing-station—is "incorrect."

Sir Henry Kimber's Committee came to Craven Street testing-station for the purpose of inspecting apparatus for testing the illuminating power of the gas. From a prior conversation I had with Sir Henry (not recorded on the minutes), I was under the impression that the Committee desired to see comparative tests made of the standard argands, on which point so much divergent evidence had been given, and that this alone was the object of the visit. It transpired, however, from a subsequent explanation of the Chairman, that all the Committee desired to do was to inspect a photometer, notwithstanding that it was the question of standard burners alone under consideration. On the arrival of the Committee, I expressed the desire that comparative tests of the No. 1 and No. 2 argands should be made, but was at once met by the protestations of Mr. Carpenter, seconded by his Counsel in attendance, Mr. C. C. Hutchinson (who, by the way, acted with me in opposition to the Dublin Gas Bill in the previous session of Parliament) that on no account would any comparative tests be permitted. What all the objections were, I do not remember, but one was the number of people in the room! I at once agree that a crowded photometer-room is not an ideal condition of things for accurate testing; but even under such conditions any disadvantage that could have arisen in the test of one burner would be the same in the case of the other.

However, the question of a definite set comparative test was decided against me; and it was only when Mr. Carpenter had finished a somewhat lengthy description of the photometer, commencing with its early history, down to modern times, that I ventured to intimate that the burners—which, up to that time had scarcely been alluded to—were also part of the science of photometry, and that one of the two in question might be attached to the instrument.

The London County Council Gas Examiner in attendance was at this stage permitted to attach the No. 1 "London" argand, and after the consumption had been carefully regulated, the observation he read out was 5·2 or 10·4 candles. After this, I looked at the disc and concurred in the observation. Later, the No. 2 "Metropolitan" argand was attached, and after rating the consumption, the County Council Gas Examiner at once read off, 13·9 (a difference of 3½ candles). But as the burner was not hot, the result was not the best. I shortly afterwards observed that, with the increasing heat of the burner, the observations were going higher, and as the Committee were departing, I drew the attention of Mr. M'Laren (who had been previouely observing the disc) that the reading had increased to 7·5 or 15 candles (or a difference of 4·6 candles).

At a later stage of the proceedings on the Bills, through an intervention on the part of the promoters, in order to try and discredit me in the eyes of the Committee for having made my observations public, through the medium of your columns, I succeeded in getting placed on the minutes the following evidence (where it stands uncontroverted to-day):—

In CROSS-EXAMINATION:

Hon. J. D. FITZGERALD: Are you responsible for this to which your name is attached? (Producing a paper containing a diagram.)

Witness: Yes.

Hon. J. D. FITZGERALD: I would like the Committee to see that. It is something which appears in the "GAS JOURNAL."

Mr. TALBOT: If something is to be handed in, the opponents are entitled to see it.

Hon. J. D. FITZGERALD: If you will allow me, I will make the point; and then you can see it.

The CHAIRMAN: You will allow Mr. Talbot to see it.

Hon. J. D. FITZGERALD: Here is the diagram.

Mr. TALBOT: That is what I want to see.

[The paper was handed to the learned Counsel.]

Witness: It is a copy of the diagram on the wall.

The CHAIRMAN: We are familiar with that.

Hon. J. D. FITZGERALD (to witness): That is a print of that diagram there?

Witness: Yes, with some addition.

Supplied by you to the "GAS JOURNAL"?—Yes.

You added to it something which is said to have happened on July 7?—Yes.

What is that?—My own observations.

Do you mean when you were present with the members of the Committee?—Yes.

Hon. J. D. FITZGERALD: The members of the Committee will know if any tests were taken on that day. You will see this gentleman has put an addition to that diagram and suggested something was done when you visited the London County Council station, and that that dotted line which is added represents something which was done on that occasion.

The CHAIRMAN: As I said before, we do not look upon that as a test, and did not ask for a test to be made. It was admitted all round a test was not made.

Hon. J. D. FITZGERALD: This is published in the paper as something that happened in your presence at the testing-station.

Witness: This is my observation. I observed the gas. The No. 1 burner was screwed on to the photometer. The flow was adjusted to 5 feet. The operator for the London County Council read out the illuminating power as 10·4.

The CHAIRMAN: He did.

Witness: And then, after that burner was taken off, the No. 2 burner was screwed on. The first observation when the burner was cold was read out by the CountyCouncil observer as 13·9 after the current had been regulated. I pointed out then it was necessary before an observation could be taken with this burner that the burner must be allowed to burn a time to get heated in order for the regenerative effect in the base of the burner to take place; and while the Committee were departing from the room, the illuminating power was increasing all the time, and I directed the attention of one of the members of the Committee to it just as he was going out of the room, and said: "The observation now has risen to 15." And I know I asked the tester the quality of gas that was being distributed in that dist ict by the Gas Company that day; and he said it was about 15 candles. So that there was the difference from the observation that I made at the station of 4·6 candles between the two burners.

Hon. J. D. FITZGERALD: You know, Sir, what happened at the station.

The CHAIRMAN: Yes.

Re-examined by Mr. TALBOT:

Mr. TALBOT: I understand you have put upon that diagram what you yourself saw on the occasion when the honourable members of the Commitee saw the test?

Witness: That is so. I had not seen it before.

The CHAIRMAN: It is common to both sides that there is a difference. I distinctly said at that time: "We cannot take this as proof of what the difference is." We did not go there for that purpose; and I do not think it was made under conditions which altogether can be accepted as proof.

Mr. TALBOT: I quite understand that, Sir. All I want to know is this. I understand my learned friend put this diagram in in this dramatic manner suggesting some misconduct on the part of Mr. Carr. I only want to know if you are satisfied with what he has said and done.

The CHAIRMAN: Yes.

Hon. J. D. FITZGERALD: Mr. Carr ought not to have suggested that any test took place when the members of the Committee were present, because I am informed that nothing of the sort took place.

Witness: May I explain? I had not seen that paper before. If they have copied a marginal note I put on the diagram and handed to the "GAS JOURNAL," they will know I did not put it as a test. I said these were my observations made on that day. So they were not proper tests; and I have never set them forth as proper tests. But they were my observations just as I could pick them up during the explanation of the apparatus, in the way I have explained.

The CHAIRMAN: We did not understand Mr. Carr as pretending at the time that it was an actual testing figure.

Witness: I stated in the marginal note of the diagram what actually took place.

Mr. TALBOT: May I respectfully call your attention to what you, Sir, said before the Committee went there, because that was the origin of the misunderstanding? No doubt it was not what you intended; but you will see how we unfortunately misunderstood what you said. We understood the Committee wished to see a test taken in their presence.

The CHAIRMAN: Did I say that?

Mr. TALBOT: You will find that if you look at p. 202; and you will see how we misunderstood. I do not in the least complain, but only wish to explain it.

The CHAIRMAN: Perhaps I did say I wanted to see how a test was operated—that is, the *modus operandi* of the test, not the resulting figures.

Mr. TALBOT: Please understand I do not in the least complain of what you have done—it would not become me to do so if I thought there was ground for it. But there is no ground for it.

The CHAIRMAN: I quite understand.

Mr. TALBOT: May I read it? These are the words you are reported to have used, Sir: "I spoke yesterday about the Committee going to see a testing of the gas with one expert on each side; and I believe it has been arranged to-day." I quite understand what was in your mind. You merely wanted to see how the test was taken. We, unfortunately, thought you meant you wished to see the two burners compared in your presence. You see how the misunderstanding arose.

The CHAIRMAN: Yes, I do. Perhaps I am responsible for it. I ought to have negatived it.

Mr. Carpenter may stigmatize the observations taken by me, and the results adduced, as "grotesque;" but they are sufficient for me to ask Mr. Carpenter, now, if he will deny that there is a difference of 4·6 candles, or thereabout, between the No. 1 "London" and the No. 2 "Metropolitan" argands, with the 15-candle gas supplied by the Gas-light and Coke Company, in which case I am ready to meet Mr. Carpenter at Craven Street, and give him the opportunity of disproving what I have said is the difference between these two burners—the difference I say I have established.

I do not think there will be any difficulty in arranging with the County Council for this to be done.

Widnes, Feb. 18, 1911. ISAAC CARR.

Hastings Electricity Supply.

SIR,—This matter attracts considerable attention, for it is an unfortunate example of municipal trading and rate-aided competition.

With regard to converting public lamps from gas to electricity, in most places where this has been done some advantage to ratepayers has generally been shown, at all events on paper; but locally the single-burner lamps charged by the Gas Company at £3 2s. 2d. per annum are converted at the expense of the ratepayers to metallic filament lamps, and charged by the Electricity Committee at £3 5s. 8d., and to do this current has to be priced at 2d. per unit. The total cost per unit sold last year was 6·74d., and the commercial absurdity of the 2d. per unit charge is obvious, seeing that the Electricity Committee, who in November, 1908, at the Local Government Board inquiry, were offering to supply converted lamps at 2d. per unit, early the following year recommended an increase in the price of current supplied to public arc lamps of 1d. per unit, or from 3d. to 4d. The arc lamps take about 140,000 units per annum; and all the lamps proposed to be converted would take about 120,000 units; so here we have current supplied for a similar purpose for the same hours charged for the purpose of arranging the accounts at two different figures.

Hastings, Feb. 17, 1911. CHAS. F. BOTLEY.

The Utilization of Coke-Oven Gas in America.

SIR,—The writer was very much interested in reading one of the "Editorial Notes" in the "JOURNAL" for Jan. 3, on the "Utilization of Coke-Oven Gas." Assuming, after reading the article, that English gas engineers may not be familiar with the progress made in America in connection with the distribution of coke-oven gas exclusively for illuminating and general domestic and power purposes throughout large populous districts, he would take an opportunity of calling attention to the production and distribution of such gas in several communities this side.

Attention was directed to the initial introduction and progress made along this line in the exhaustive paper prepared by Mr. F. Schniewind, Ph.D., the President of the United Coke and Gas Company, New York City, on the "Production of Illuminating Gas from Coke-Ovens," before the Gas Section of the Engineering Congress at Glasgow about nine years ago.* From this paper, it will be learnt that even at that time large quantities of illuminating gas—representing a total of millions of feet daily—were being supplied to the communities of Boston (Mass.), Baltimore (Md.), Hamilton (Ohio), and Camden (N.J.)

Within recent years the supply from the plant at Camden has more than doubled the original output. The gas now supplies a district of approximately 300,000 people, and is conveyed a distance of nearly ninety miles, supplying the cities of Trenton, New Brunswick, and Plainfield (N.J.), and the intermediate districts *en route*, and in addition the city of Camden, where the plant is located. The gas supplied is what is termed the rich fraction produced from the coal being carbonized; the poor fraction being used for heating the ovens. The illuminating power is maintained uniformly at about 17 candles, and the heating value at 675 B.Th.U. No enrichment is used; the gas being distributed exactly as it is delivered from the plant. Cooled in the condensing equipment, and tar and ammonia extracted, it passes through the usual process for sulphur purification.

The coke-ovens attached to a blast-furnace plant at Duluth (Minn.), supplies the gas exclusively used in the cities of Duluth and Superior (Minn.). At Baltimore and at Boston the gas supplied from the coke-ovens furnishes only a portion of the gas used, in addition to the original plants of years ago, which were installed for supplying illuminating gas. At Boston, the amount of coke-oven gas supplied averages approximately from 8 to 10 million cubic feet per day. Hamilton (Ohio) is supplied from a plant of a hundred ovens attached to a blast-furnace in the vicinity.

The most recent and up-to-date plant installed in this country was for the Citizens Gas Company, Indianapolis (Ind.), which has been operating for about fourteen months, supplying gas to the consumers at the rate of 60c. per 1000 cubic feet, which is the lowest price at which illuminating gas is furnished to regular consumers in this country. The average candle power and heat value of the gas supplied from this plant, as well as all the others, are about the same as set forth for that distributed from the plant here at Camden.

From this information, it will be seen that the distribution of gas from coke-ovens has been in regular commercial practice throughout large communities, which have been wholly dependent upon it, during periods covering the past ten years.

The system of ovens which we have installed (supplying the aforementioned communities) is known in this country as the United-Otto system; and throughout the Continent and Great Britain as that of Dr. C. Otto and Co. We are enclosing a print of a drawing illustrating the type of plant which has been in operation here at Camden for the past eight years.* The system of ovens known as the Semet-Solvay in this country are supplying gas to local gas companies for part distribution in the communities of Detroit (Mich.), Milwaukee (Wis.), Chicago (Ill.), and Chester (Pa.).

AMERICAN COKE AND GAS CONSTRUCTION CO.,
EDWIN A. MOORE, President.

Camden, N.J.. Feb. 1, 1911.

* See "JOURNAL," Vol. LXXVIII., p. 691.

The Efficiency of Gas-Boilers for Domestic Use.

SIR,—Having read in the "JOURNAL" the paper delivered before the Liverpool Engineering Society, I shall be glad if you will allow me space for the following remarks.

I notice that, in testing for efficacy, the tank-system of apparatus was used, which it is generally agreed is a bad form as occasioning heat-loss, and that it was compared with a combined heater-storage-tank. It also appears no water was drawn from the apparatus. It is my practice when making tests to carry them out under ordinary working conditions—that is, to meet general household requirements as nearly as is practicable. The following are some tests made; and it will be seen that some deal convincingly with the question of whether an efficiency of over 90 per cent. is obtainable.

Test 1.—Made first with a 20-gallon combined heater-storage-tank, with its own burners. Cold water, 60° Fahr.:

Gas Consumed.	Quantity of Water Drawn.	Temperature of Water Issuing from the Tap.	Temperature of Bulk of Water in Receiving Tank.
33 cubic ft.	First 15 gallons	120°	115°
33 ,, ,,	Second ,,	149°	132°
34 ,, ,,	Third ,,	153°	136°
100 cubic feet.	Total, 45 gallons.	Aver. 140°	Aver. 128°

Test 2.—The same heater-storage-tank, but with a cast-iron boiler connected up, the heater's own burners not lighted. Cold water, 60° Fahr.:

Gas Consumed.	Quantity of Water Drawn.	Temperature of Water from Tap.	Temperature of Bulk.
33 cubic ft.	First 15 gallons	154°	124°
33 ,, ,,	Second ,,	164°	144°
31 ,, ,,	Third ,,	166°	147°
97 cubic feet.	Total, 45 gallons.	Aver. 161°	Aver. 138°

This test was made at the request of a gas company, and the figures taken by one of their staff.

An advantage obtained when a storage tank is connected up to a separate boiler is that some hot water—water at a quite high temperature—can be obtained in about 15 minutes after lighting the gas. In a 15-minute test made with a copper boiler, some water at 140° was obtained; while with a cast-iron boiler, some water at 153° was secured in the same period. In each case, 8 cubic feet of gas were burned (32 cubic feet per hour). If water at this temperature was required from a combined heater-storage-tank, the time occupied could not be less than 1¼ hours, with a gas consumption of (say) 60 cubic feet, owing to the fact that the whole contents of the storage vessel have to be heated. Another advantage of the separate boiler and storage tank is that, by a duplicate return connection, the water in the upper part of the tank can be heated alone when desired, with marked economy as a result.

Regarding boiler efficiency, it is stated that several makes of boilers were tested, and that the maximum efficiency has to be considered as 66·75 per cent.; and doubt is thrown on those makers who claim an efficiency up in the nineties. My tests show that a percentage above 90 is possible, with several makes of boilers—Potterton, Davis, and Wilson as examples; and I may give the figures of two tests as follows. (Aug. 30. Cold water, 68° Fahr.)

Test 3.—A copper boiler circulating 14 gallons of water per hour. Gas consumption, 32 cubic feet per hour.

Time.	Temperature of Flow-Pipe.	Temperature of Flue.
9.5 ..	68° ..	—
9.10 ..	120° ..	140°
9.20 ..	140° ..	170°
9.25 ..	144° ..	186°
9.30 ..	154° ..	196°
9.35 ..	160° ..	208°
9.40 ..	164° ..	218°
9.45 ..	165° ..	224°
9.50 ..	165° ..	228°
9.55 ..	165° ..	230°
10.0 ..	165° ..	230°
10.5 ..	165° ..	230°
10.10 ..	165° ..	230°
10.15 ..	165° ..	230°

* This is reproduced on p. 509 of to-day's issue.—ED. J.G.L.

This test shows that, with a gas consumption of 32 cubic feet, the water was raised from 68° to 165°, giving an efficacy of 424 units per cubic foot of gas consumed.

Test 4.—The same boiler and conditions, but with a consumption of 21¼ cubic feet of gas per hour. Result: Water raised from 68° to 138°; flue, 181°. Efficacy, 455 units per cubic foot of gas used.

Test 5.—The same boiler and conditions, but with a gas consumption of 15½ cubic feet per hour. Result: Water raised from 68° to 122°; flue, 181°. Efficacy, 487 units per cubic foot of gas used.

This last test shows over 90 per cent. efficacy.

Test 6.—A "Victor" iron boiler, No. 1, circulating 14 gallons of water per hour. Gas consumption, 32 cubic feet per hour.

Time.	Temperature of Flow-Pipe.	Temperature of Flue.
6.0	68°	—
6.5	118°	110°
6.10	138°	127°
6.15	153°	134°
6.30	169°	147°
6.40	172°	151°
6.45	172°	153°
7.0	172°	153°
7.15	172°	154°

With 32 cubic feet of gas, the water was raised from 68° to 172°. Efficacy, 455 units per cubic foot of gas used.

Test 7.—The same boiler and conditions, but with a gas consumption of 21 cubic feet per hour. Result: Water raised from 68° to 145°; flue, 130°. Efficacy, 514 units per cubic foot of gas used.

This shows over 90 per cent. efficacy.

It is found that the use of gas for domestic hot-water service is too expensive for continuous consumption; and it is the practice for consumers to use the gas for short periods at a time. If the separate boiler and storage-tank are employed, connected up on a modern system, the best results possible are obtained during short-period duties, as small quantities of hot water can be had by a consumption of 20 cubic feet of gas in summer, or 30 cubic feet in winter. A test of this showed that the water in the top of the storage tank was at 140°, while at the bottom it was 42°. With the combined heater-storage-tank, the whole contents have to be heated, entailing a consumption of about 60 cubic feet in summer (for 150°), and (I find it necessary to add 50 per cent. for winter) 90 cubic feet in winter.

Regarding the efficacy of the heater-storage-tank referred to by the writer of the paper, it is stated that 60 cubic feet of gas heat 20 gallons of water from 60° to 150°—a rise of 90°. This gives to the water only 300 units per cubic foot of gas consumed. If the 20 gallons were run out into a measuring tank, there would be a fall in temperature in the bulk of 15°, and the water would be 135° (=250 units per cubic foot of gas). Allowing that an equal quantity of cold water at 60° was added, there would be 40 gallons at (135° + 60° = 195° ÷ 2) 97½° Fahr. This is equivalent to a 20-gallon bath at 97½° for a consumption of 30 cubic feet of gas.

The following is a result I obtained with a cast-iron boiler during the past cold weather. Outside temperature, 33°; water in cistern, 38°; water entering cistern from main, 42°; 30 cubic feet of gas consumed; hottest water (for shaving, &c.), 130°; 20 gallons drawn in bath, temperature of the drawn water in bulk, 100°. A further 30 cubic feet of gas were then consumed, and gave hottest water 139°; 20 gallons drawn for a second bath, temperature in bulk 106° (= 426 units per cubic foot of gas, or 82 per cent.) It should be noted that this latter result was after the water was first transferred from the boiler to an uncovered storage tank, and from there run into an open galvanized iron measuring-cistern. Without the heat-loss thus occasioned, the boiler's efficacy would be over 90 per cent.

Dealing with the subject of thermostats, it is stated that there are many failures; the commonest fault with the ordinary capsule valve being that it commences to shut down immediately the temperature starts to rise, thus retarding the heating process. In instances where this occurs, presuming the particular valve referred to is of a satisfactory pattern, it must be obvious that the thermostat is either placed in an incorrect position in relation to the direction of circulation, or that the boiler heats water with greater rapidity than the flow-pipe will carry it away, as provided proper conditions in these respects exist the valve has a constant flow of cold water through it until the contents of the apparatus have reached the desired temperature. Back-heating is quite likely to happen under certain conditions and influences; but provided the pipe sizes are proportionate with the power of the gas-flame, and correct in relation to the head and horizontal run, the objections stated are unknown.

Adverting to the discussion, some interesting points were raised in regard to gas consumption, and the direction of the circulation from the cast-iron boiler when working with the reduced flame.

First dealing with the former. For general household purposes, a bye-pass flame of 8 to 10 cubic feet is of distinct advantage, as it is seldom possible to so effectively cover the piping and apparatus generally that no heat-loss is occasioned; and this being so, the contents of the apparatus commence to cool down unless the heat provided in this way is sufficient. In many houses of a good class towel-rails exist, and possibly a linen-coil also, where some such marginal heat is particularly necessary; and with an installation properly carried out, the thermostat should be set to provide for these in exact proportion to the requirement, which is easily determinable. Were it not so, the apparatus would slowly cool down, more particularly in its extremities, without causing the gas consumption to increase for a considerable time; and, under certain conditions, the temperature of the water might therefore be unsatisfactory.

Secondly, in regard to the direction of circulation. Assuming from the description that the boiler is of the "Victor" make, there appears to be some misconception as to the working principle, as no matter how small the gas-flame may be the direction of the flow is constant and regular.

I would further point out that, upon the cessation of heat in a boiler, the circulation only continues so long as allows the hot water to collect in the storage-vessel. If, therefore, as is suggested, the bye-pass flame is of so little account, there would not be sufficient heat generated to cause circulation either way. It is, however, quite a mistaken idea to think that any reversal of the circulation occurs, as with properly arranged connections this is quite impossible. If the writer of the paper experienced any such effect, I can only conclude that the return-pipe to the boiler had greater vertical rise than the flow which leaves the boiler at a lower level—this unusual principle perhaps being misunderstood.

I regret to have to ask for so much space in your paper, but think all the points referred to are of general interest.

T. POTTERTON.

Balham, S.W., Feb. 15, 1911.

The Publicity and General Purposes Committee.

We have received from Mr. R. W. Edwards, the General Manager and Secretary of the Aldershot Gas, Water, and District Lighting Company, a copy of the following letter addressed by him on Saturday last to Mr. Walter T. Dunn, the Secretary of the Institution of Gas Engineers.

Dear Mr. Dunn,—With reference to your letter of the 15th inst., in which you intimated that, in accordance with my suggestion, you had sent a copy of the statement of appeal to my Chairman and to each of the other Directors of this Company, I have now had an opportunity of discussing the matter with my Board at their meeting yesterday.

In the first place, I would point out that this Company is somewhat unique as compared with many others, inasmuch as of the total quantity of gas made 36·2 per cent. is sold in out-districts, where either there is no electric competition or this Company hold electricity powers; 15·6 per cent. is under special contracts where electric competition is not met at all; and but 37 per cent. is sold in the town of Aldershot, in which we come in conflict with electricity. The remainder is made up of our consumption on the works and unaccounted for.

With this information, you Committee will be better able to appreciate what the Company have resolved to do. It has been decided to join the movement, and to contribute to the fund at the rate of 2s. 6d. per million on our annual make, for a period not exceeding three years, if fifty other undertakings do the same, also provided the Company are satisfied from time to time that the fund is being properly and efficiently managed. Otherwise they reserve the right to withdraw at any time.

Belfast Gas Committee Chairmanship.

At a meeting of the Belfast Gas Committee some days ago, Mr. J. A. Doran, the retiring Chairman, expressed his desire that his name should not be put in nomination for re-election. In doing so, he referred to the lengthened term of eight years during which he had acted as Chairman, and presided over the Committee's deliberations. He said he had at all times been ably supported by the members of the Committee and their officers; and while not continuing in the chair, he hoped to retain the interest he had always had in the important work of the Committee. In retiring from office, he thanked the Committee for their support and courtesy to him while acting as Chairman. It was then resolved—"That a record be made on the minutes of the Committee's regret at the decision arrived at by Councillor Doran, and their recognition of the invaluable services rendered to this Committee in the discharge of their responsible duties by Councillor Doran during the eight years he filled the office of Chairman, from 1903 till the present time, and an expression of their satisfaction that they will still have the benefit of his service as a member of the Committee." Subsequently Alderman James Craig was elected Chairman of the Committee for the present year. The output of gas for the year 1904—shortly after Mr. Doran became Chairman of the Committee—was 1,803,564,000 cubic feet; while for the year 1910 it was 2,236,438,000 cubic feet. The automatic meters, which were introduced during Mr. Doran's chairmanship, have proved exceedingly popular; and there are now no fewer than 28,764 of them in use.

Sulphate of Ammonia in America.—According to the "Engineering and Mining Journal" of New York, the principal feature of the market for sulphate of ammonia in the past year was a steady rise, interrupted at times with small recessions, but always recovering and seeking still higher levels. The price of domestic at the beginning of 1910 was $2·70 per 100 lbs., but rising constantly. By March it reached $2·85, then receded to $2·80 or a little less. The price was stationary until the end of August, when an upward tendency was again manifest; the end of September bringing $2·89, and of October $2·97. For the rest of the year, the market was almost bare of spot domestic; but the imported article ruled at $2·83 to $2·90. The outlook for future business arising from the recovery plants building and projected in the country is stated to be unquestionably good.

Charge to Prepayment Meter Users at Carlisle.—The Carlisle Gas Committee intimate a new scale of charges for those who use slot-meters. The price of gas supplied to them will be reduced from 2s. 9d. to 2s. 6d. per 1000 cubic feet; and they will be given the option of having either a griller or a cooker supplied to them free of charge. The Chairman (Mr. Buck), in explaining to the Council the reasons which had actuated the Committee in adopting this scheme, said it was the accepted policy of nearly all gas undertakings, and had generally proved profitable. It encouraged the consumption of gas, especially in the spring and summer months, when the use of a coal-fire for cooking purposes was apt to be somewhat trying to the cook, and when in the natural course of things the consumption of gas for illuminating purposes diminished. He did not think the Gas Committee would experience any financial difficulty in providing the additional grillers and cookers that might be required. Some of the members, however, took exception to the proposal on the ground that it would not prove remunerative to the Corporation; and the discussion was, by consent, adjourned till the next Council meeting.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time: Ely Rural District Water Bill, Harrogate Corporation Bill, Hastings Corporation (Water and Finance) Bill, Kingston-upon-Hull Corporation Bill, Metropolitan Water Board (New Works) Bill, Oystermouth Urban District Council Bill, Rhondda Urban District Council Bill, Slough Urban District Water Bill, Swinton Urban District Council Bill.

Petitions have been presented against the following Bills:—

Ashborne and District Gas Bill, by the Derbyshire and Staffordshire County Councils.

Bedwellty Urban District Council Bill, by the promoters of the Rhymney Valley Water Board Bill and the Mynyddislwyn Urban District Council.

Chapel-en-le-Frith, Chinley, and District Gas Bill, by the Cheshire and Derbyshire County Councils.

Chester Water Bill, by the Cheshire County Council, the Chester Corporation, the River Dee Fishery Board, and the Duke of Westminster.

Enfield Gas Bill, by the Middlesex County Council.

Harrogate Corporation Bill, by the Masham Urban District Council.

Hastings Corporation (Water and Finance) Bill, by the East Sussex County Council and the Bexhill Water and Gas Company.

Kingston-upon-Hull Corporation Bill, by the Humber Conservancy Board and the Skirlaugh Rural District Council.

Merthyr Tydfil Corporation Water Bill, by the Brecon and Glamorgan County Councils, the Standing Joint Committee of the Quarter Sessions and Council of the County of Brecknock, the Cardiff Corporation, the Bedwellty and Rhymney Urban District Councils, and the Pontypridd and Rhondda Joint Water Board.

Metropolitan Water Board (New Works) Bill, by the Bucks and Middlesex County Councils, the Chertsey, Greenford, Slough, Sunbury-on-Thames, and Willesden Urban District Councils, the Staines Rural District Council, the South-West Suburban Water Company, the Conservators of the River Thames, and the Willesden Board of Guardians.

Oystermouth Urban District Council Bill, by the Oystermouth and District Water-Works Company, Limited.

Rhymney Valley Water Board Bill, by the Brecon County Council and the Standing Joint Committee of the Quarter Sessions and Council of the County of Brecknock, the Cardiff Corporation, the Barry, Bedwellty, and Rhymney Urban District Councils, the Brecknock Rural District Council, the Merthyr Tydfil Gas Company, and the Pontypridd and Rhondda Joint Water Board.

Slough Urban District Water Bill, by the Middlesex County Council.

Whaley Bridge Gas Bill, by the Cheshire and Derbyshire County Councils.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read a second time and committed: Bicester Urban District Gas Bill, Blackburn Corporation Water Bill, Chesterfield Gas and Water Board Bill, Hornsea Urban District Council Bill, Ipswich Corporation Bill, Margam Urban District Council Bill, Marple Urban District Council Gas Bill, Paignton Urban District Council Bill, Rotherham Corporation Bill, St. Helens Corporation Bill, Thames Conservancy Bill.

Bill read the third time and passed: Warrington Corporation Bill (suspended from last session).

Petitions have been presented against the following Bills:—

Chesterfield Gas and Water Board Bill, by the Derbyshire County Council and the Derby Corporation.

Gaslight and Coke Company's Bill, by the Barking Urban District Council.

Margam Urban District Council Bill, by the Glamorgan County Council.

Marple Urban District Council Gas Bill, by the Derbyshire County Council and the Ludworth Parish Council.

St. Helens Corporation Bill, by the Ashton-in-Makerfield Urban District Council and the Warrington Corporation.

Tamworth Gas Bill, by the Warwickshire County Council.

Thames Conservancy Bill, by the Metropolitan Water Board and the Woking Water and Gas Company.

West Cheshire Water Bill, by the Bromborough Urban District Council and the Wirral Rural District Council.

Reduction in Price at Weston-super-Mare.—The gas consumers at Weston-super-Mare, having enjoyed a reduction in the price of gas from 3s. to 2s. 10d. per 1000 cubic feet some twelve months ago, are now to have a further concession of 2d., which will make the charge 2s. 8d. per 1000 cubic feet—subject to a discount, ranging up to 15 per cent., according to the amount of gas consumed.

Railway Station Lighting by Gas and Electricity.—Being desirous of improving the lighting of New Street Station at Birmingham, the London and North-Western Railway Company invited the Electric Supply Department and the Gas Department to submit schemes and give demonstrations in the station. High-pressure gas has been fitted upon No. 1 platform; and up-to-date electric lighting has been installed on No. 3 platform. The latter was switched on last Tuesday evening, in the presence of the Lord Mayor (Alderman W. H. Bowater), the Chairman of the Electricity Committee (Mr. Ellaway), several officials, and Mr. Haydn Harrison (the drafter of the scheme). It is intended to make a careful comparison of the two systems of lighting, both from the standpoint of economy and of efficiency.

LEGAL INTELLIGENCE.

WEYMOUTH WATER COMPANY'S SURPLUS FUNDS.

Question as to Payment of Back-Dividends.

In the Chancery Division of the High Court of Justice last week, Mr. Justice PARKER had before him on two days a special case, stated by consent, in which the opinion of the Court was sought on the question of the appropriation of the surplus funds of the Weymouth Water Company. The Company were the plaintiffs; and Messrs. Coode and Hassell the defendants.

Mr. ROMER, K.C., who appeared (with Mr. PEMBER) for the Water Company, read the case. It set forth that the Company was incorporated in 1797; but the Act of that year was repealed by one passed in 1855, which incorporated the Companies Clauses Consolidation Act, 1845, and the Water-Works Clauses Act, 1847, and fixed the capital of the Company at £40,000, in 2000 shares of £20. No maximum rate of dividend was prescribed; and therefore, under section 75 of the last-named Act, it was 10 per cent. In 1897 another Act was obtained, extending the Company's limits of supply, and authorizing the raising of additional capital not exceeding £60,000, with a maximum dividend of 5 per cent., "unless a larger dividend be at any time necessary to make up the deficiency of any previous dividend which should have fallen short of 5 per cent." Of this additional capital, £39,000 had been issued from time to time, and fully paid up. Down to September, 1855, no dividend was declared by the Company; but since then dividends had always been paid at varying rates. From 1907 down to June last, full dividends—viz., 10 per cent. on the old shares and 5 per cent. on the new—had been paid; and a reserve fund to the amount of £6490 had been created. The aggregate of the deficiencies of dividends on the old shares down to 1908 amounted to upwards of £50,000; while the aggregate deficiency on the new shares was upwards of £2000. The Company are in a prosperous condition; and the profits are now, and, so far as can be foreseen, will continue to be, sufficient to provide, after payment of dividends at the prescribed rates on the old and new shares respectively, a substantial surplus available for the payment of further dividends towards making up past deficiencies. The Company are desirous of using the surplus for this purpose; but questions arose as to the mode in which the dividends should be appropriated as between the two classes of shareholders. After reading some seven or eight elaborate questions which were appended to the case, suggesting various modes of dealing with the surplus funds, Counsel said he would leave the argument in the hands of Mr. Stokes who appeared for the first defendant, the holder of sixteen old shares, and Mr. Tomlin, who represented the second, the holder of ten new shares.

Mr. STOKES said there was in this case a large deficiency attributable to the old shares, and a much smaller one to the new shares; and he submitted that it would be only just to divide the extra dividend between the two classes in the same proportion. If, however, this view were not adopted, he would suggest that the division should be in the same proportion as that prescribed—viz., £10 to the old shares for every £5 given to the new ones. This would go on until all the arrears on the new shares were wiped out; and then, of course, the whole surplus would go to the possessors of the old shares. Another plan would be to take each year separately, starting at the beginning, and wiping off the arrears by degrees. This would involve giving the whole to the old shareholders in the first place.

Mr. TOMLIN argued at some length that, on the true construction of the various Acts of Parliament, and especially a certain section of the Companies Clauses Consolidation Act, any surplus dividend paid to make up past deficiencies was a dividend for the current year, and ought to be divided equally between all the shareholders according to their holding; and that, except as to "the prescribed rate" of 10 per cent. in one case and 5 per cent. in the other, to which the additional dividend had no relation, all the shareholders were of one class, and had equal rights. The Company had first to ascertain the amount required to pay the prescribed dividend on the aggregate capital, and any surplus profits then left might be divided as a "larger dividend" to make up previous deficiencies; and he submitted it should be divided equally.

Mr. Justice PARKER, in giving judgment, said it appeared to him that the Act of 1897 contemplated that the Company should make in respect of the new shares a separate dividend from that which they declared on the old shares; and this appeared to remove any difficulty which might otherwise have arisen. They had to ask themselves, in the case of the dividend on the new shares, whether a larger dividend than 5 per cent. was justified on the ground of its being required to make up the deficiency of any previous dividend which had fallen short of the 5 per cent.; and similarly when declaring the dividend on the old shares. When the Company were going to pay what were often inaccurately described as "back-dividends," they must deal with the two classes of shares separately, and might declare a larger dividend in respect of each class until the arrears in respect of that class had been satisfied; and then they must stop. The only other point was whether it was allowable for the Company to pay back-dividends in respect of one class of shares without at the same time providing a corresponding dividend in respect of the other class; both being *ex hypothesi* in arrear. He thought the proper way was to treat the extra dividend as one payable for the year, and to preserve the same proportion between the total dividends paid to the two classes of shareholders as existed by Statute with regard to the maximum dividend—*i.e.*, if a dividend of 12 per cent. was paid on the 10 per cent. maximum shares, 6 per cent. should be paid on the 5 per cent. shares. This could be done until the whole of the arrears on the new shares had been paid off; and thenceforward no higher dividend than 5 per cent. could be paid on those shares. The same thing would take place in the case of the old shares. This seemed to him to be in accordance with the words of the Act, and also just as between the parties.

LIVERPOOL WATER-WORKS ASSESSMENT APPEAL.

The Corporation Unsuccessful.

This was an appeal by the Assessment Committee against a judgment of the Quarter Sessions for the county of Lancaster, sitting at Preston, on an appeal by the Corporation of Liverpool against an assessment upon the gathering-ground purchased by them in connection with their Rivington Water-Works. The Justices held that the Corporation were not rateable in respect of this ground, but stated a special case for the opinion of the Court. The decision appealed from was as follows: (1) That the Corporation of Liverpool were not in rateable occupation of the land in question, with the exception of the parts used by them for plantations and nurseries. (2) That the plantations and nurseries should be assessed, under section 4 of the Rating Act, 1874, at 2s. per acre and 15s. per acre respectively. (3) That the price paid by the Corporation for the gathering-ground was no evidence of the rateable value of the land used for plantations and nurseries.

The proceedings at the Quarter Sessions were reported in Vol. CIX. of the "JOURNAL," pp. 49, 668; and the appeal was recently heard before the LORD CHIEF JUSTICE and Justices HAMILTON and AVORY.

Mr. DANCKWERTS, K.C., Mr. RYDE, K.C., and Mr. GORDON HEWART (instructed by Messrs. Crowder, Vizard, Oldham, and Co., agents for Messrs. Stantor and Sons, of Chorley), appeared for the appellants; Mr. BALFOUR BROWNE, K.C., Mr. MACMORRAN, K.C., and Mr. OULTON (instructed by Messrs. F. Venn and Co., for Mr. E. R. Pickmere, Town Clerk of Liverpool) represented the Corporation.

Mr. DANCKWERTS said the question shortly was whether a certain area of land, of which he put in a plan, which formed an integral part of the water-works of the Liverpool Corporation, and was used as a gathering-ground, was rateable. He said of course it was very desirable to keep this land clean, and therefore it was not allowed to be cultivated; but the sporting rights were let off—the lessee being separately rated under the Act of 1874, as being dissevered from the occupation. Counsel read the special case, which stated that the only material question on the appeal to Quarter Sessions (other points having been agreed) was as to the assessment of £1165 in respect of land forming part of the gathering-ground. The Corporation in the first place owned only the land occupied by the reservoirs and works into which they received the water flowing naturally from the gathering-ground. But in order to prevent the possibility of pollution, they purchased the greater portion of it, including the part now in question, which was bought at the price of £26 10s. per acre. Other parts were subsequently bought, some by agreement and others under compulsory powers, at various prices—in one case £76, and in another £409 per acre; the average cost of the whole 10,000 acres being £45 per acre. On the land in question there were some farm buildings, which were demolished or were left unoccupied; 297½ acres were planted with trees; and 8½ acres were used as a nursery for young trees, and enclosed. The remainder was moorland. The sporting rights were let on lease; and the gamekeeper of the sporting tenant, with the authority of the Council, warned off trespassers. The Corporation admitted that they were in occupation of the plantations and nursery, but contended that these did not increase the profits of the water-works, and were rateable only at their actual value, under section 4 of the Act of 1874, and not on the basis of any increased value as a gathering-ground. With regard to the remainder of the land, they contended that it was unoccupied except by the sporting tenant, and that it did not increase the value of the water-works. The Assessment Committee contended that the Corporation were in rateable occupation of the land in fact; and, further, that the undertaking must be treated as a whole, so that they could not be in occupation of one part and not of another. As to the value, they said the price given for the land was the best evidence, and 3½ per cent. on this was the rateable value. The Quarter Sessions decided that the Corporation were not in rateable occupation of the land, except the plantations and nursery, which ought to be valued, under the Act of 1874, at 2s. and 15s. per acre respectively; and that 3½ per cent. on the price paid for the whole ground was no evidence of the rateable value of the plantations and nurseries. Appended to the case was an elaborate judgment by Mr. Worsley Taylor, K.C., the Chairman of the Bench. Counsel submitted, first, that when a man was owner in fee of land, and in legal possession of it, unless someone else occupied it, he was in law the occupier; and, secondly, that, in arriving at the value, the Court of Quarter Sessions ought to have simply considered what rent the Corporation would have given for the land for the purpose of using it in the way they did. The whole thing was one undertaking, extending over many parishes; and they could not say that this or that part was unoccupied when, in fact, they accepted the whole. The case of empty houses, which were not rated, might be quoted against him; but Lord Blackburn years ago said this was an anomaly he could not understand, and which could only be supported by long custom. He (Counsel) submitted that such an anomaly ought not to be extended.

The LORD CHIEF JUSTICE suggested that, even if an empty house was not rateable, it did not follow that empty land was not.

Mr. DANCKWERTS said this was his point. It had been held in the House of Lords that where a man was owner in fee, and intended to use the house or land himself, he was in occupation; but where he only held it for the purpose of someone else using it when he could let it, he was exempt. This was the case in *Winstanley v. Overseers of North Manchester*, from which he quoted passages to show that an owner in fee in possession was *primâ facie* in occupation. He went on to cite a number of other cases, including *Harter v. Overseers of Salford*, where the owner of a silk mill which was shut up, but contained the machinery, was held to be rateable, but as for a warehouse and not for a mill. He next cited *Rex v. Mellidew*, in which it was held that there was the occupation of a warehouse, though it was shut up; and one or two others to the same effect. He submitted that the Banbury Railway case, which was relied upon in the judgment, had no application to the present case. This was on the second point—the valuation to be put upon the admittedly rateable part of the land. On the other hand, *Davis v. Syston Union* was a case in which certain land was used as a sewage farm, and was also let to a farmer for agricultural purposes; and it was held that both purposes must be taken into account in assessing the value. Counsel concluded by reading the judgment of Mr. Worsley Taylor. Commenting upon it, he thought the learned Chairman had overlooked the judgment in the Winstanley case.

Mr. BALFOUR BROWNE, for the respondents, said there were two questions at issue: Whether the Corporation were assessable at all in respect of the gathering-ground; and, if so, whether it should be on an annual value of £1165. The first was by far the more important. The proposition put forward on the other side was that where a man was owner in fee in possession, unless someone else was in occupation the owner was. This he entirely disputed. Possession was not the same as occupation. A man might be owner of an empty house, and not occupy it. Still he would be in possession, and would have a right to turn off trespassers; and he (Counsel) could not see the distinction between an empty house and an empty piece of land. This had been decided more than once. In *Reg. v. St. Pancras*, it was said that legal possession did not of itself mean occupation. All the cases referred to by his learned friend showed some act of occupation on the part of the owner—either the presence of machinery or furniture in the place, or the putting in of a caretaker. It was quite conceivable that a person should buy land or a house, for the express purpose of leaving it unoccupied; and this was just what the Corporation did here. A person might buy the house on either side of the one in which he lived, and keep them both empty for the purpose of avoiding the annoyance of piano-playing or other noises; and as he did not occupy them, he would not be rateable. The whole object of the Corporation of Liverpool in buying this land was to keep it unoccupied. The shooting tenant occupied it for a certain purpose; but for every other purpose the land was unoccupied. Even if they patrolled it to keep off trespassers, it would not be occupying; but this was done by the shooting tenant for his own purposes. The plantations were occupied simply as moorland. There were no works done in them for the purpose of improving or altering the water supply; all that was done was what was necessary to them as plantations. It was true the Corporation had more effective power to protect their reservoirs from impurities; but the very Union which was trying to rate them for this land were rating the reservoirs at £22,000, and were receiving rates on this sum. Counsel referred to a passage from Lord Mansfield's judgment in *Rex v. St. Luke's Hospital*, in which he said the liability to pay rates depended on the will of the proprietor. The owner of a house might, if he pleased, pull it down, and the owner of lands might let them lie barren and unoccupied; and the tithes and rates varied according to the produce. The principle there enunciated was that it depended entirely upon the will of the owner. Modern legislation suggested that this should not be the case; and in future, if he had a piece of land lying vacant near a town, a surveyor might come and say that he ought to put up a three-storey house on it, and that if he did not he would be rated just the same. But this was not the law at present. In answer to questions from the Court, Counsel said, in his view, if sheep were pastured on the land it would be a rateable occupation of it; but if they were turned off in order to prevent pollution of the water, the land would then be unoccupied and not rateable. Even if a man kept a piece of land for the purpose simply of walking over it, he (Counsel) should admit that he occupied it—in fact, if he did anything on it or with it. But here the Corporation did absolutely nothing—no more than they did before they bought it, when no one could suggest that they occupied it. If he had a house with a piece of vacant land opposite, on which he heard that buildings were to be erected, and he bought the land and kept it vacant for the mere purpose of preserving the view, he would not be the occupier or be rateable. The position of the Corporation was simply that of possession, but not of occupation.

Mr. Justice HAMILTON asked if there could be a case of unoccupied land if this was not one.

Mr. BALFOUR BROWNE said he thought not. With regard to Winstanley's case, on which his friend mainly relied, he submitted that there was a clear case of occupation on the facts; and therefore it had no bearing upon the present case. The same observation applied to Mellidew's case. He concluded by submitting that the price paid for the land, though it might be taken into consideration, was not the criterion by which to judge of the rateable value.

Mr. DANCKWERTS, in a brief reply, suggested that the passage read from Lord Mansfield was only an *obiter dictum*, and that the decision in the case that a hospital was not rateable was no longer law.

Judgment.

The LORD CHIEF JUSTICE delivered a long and elaborate judgment, holding that the Corporation were in rateable occupation of the whole gathering-ground, but that on the other points the judgment of the Court of Quarter Sessions was right.

Mr. Justice HAMILTON said the first question, whether the applicants were or were not in rateable occupation of the gathering-grounds, was, of course, essentially one of fact. The passage relied upon from the opinion of Lord Atkinson in Winstanley's case, which was acquiesced in by all the other noble Lords, if it were part of the reasoning of the decision bound them; and if it were not, it was still a declaration of the principles applicable to rating law from which he should with difficulty be constrained to differ. He did not see how it could be questioned that the fact that the Liverpool Corporation were owners in fee simple in possession of the gathering-grounds was *primâ facie* evidence of occupation. It was, of course, rebuttable—firstly and most directly by proof that somebody else was in occupation; and, secondly, from the way in which the proposition was put in some of the cases, by the nature of the case. In none of the cases to which reference was made in the judgment in the Winstanley case, nor in that case itself, was there any question at all of a derelict tenement. They were all cases in which use was in fact being made of the premises; and he did not read the passage as in any way disputing that there might be cases where the owner having nothing but bare ownership, and not using the property in any way, might not be rateable, even although there was no evidence showing that anybody else was in occupation. The suggestion made that the principle laid down in the Winstanley case went too far, which was supported by reference to two cases—one of Lord

Mansfield and the other of Mr. Justice Lush—appeared to him to be one which could not be sustained. Dealing with the argument that the proprietor of lands could not, by his own private voluntary act, discharge his property from his legal duty, Lord Mansfield said his answer to this was that it did not hold true in fact; instancing, as an illustration, that an owner of a house might, at his own will and pleasure, pull it down and convert it into a toft, and thereby affect the value at which it could be rated. The owner of lands might, if he pleased, suffer them to lie barren and unoccupied. He then passed on to the question of time—a passage which did not appear to conflict at all with the proposition that, even in the case of barren and unoccupied land, the ownership might be *primâ facie* evidence of occupation. The passage cited from the judgment of Mr. Justice Lush did not seem to him to conflict any more with the proposition in the Winstanley case, as he understood it. He said that legal possession did not of itself constitute occupation; and he instanced the case of the vacant house. But he did not say anything to conflict with the view that ownership might be *primâ facie* evidence, and in most cases useful *primâ facie* evidence, of occupation, failing proof that some other person was in occupation. It therefore appeared to him (his Lordship) that in the present case no question arose of distinguishing, still less of dissenting from, the principle laid down in the Winstanley case. Here not only was there *primâ facie* evidence of occupation in the fact that the Liverpool Corporation were owners of the fee simple in possession, not only was there the absence of any rebutting evidence that anybody else was in possession, but any doubt that might be left seemed to be amply covered by the objects with which the ownership was acquired and held by the Corporation. The ownership was acquired and held for a specific purpose; and it appeared to him that, upon the facts found, this specific purpose carried with it, and was intended to carry with it—to use a non-controversial term—control. In the retention of control, and the intention to exercise it in case of need, the whole object of the acquisition of the land lay, and the greater part of the present case on the first question turned. The land having been acquired by a large, though no doubt a very wise, expenditure of money, the new owners proceeded to exercise upon it very considerable physical acts of occupation. They demolished certain farm houses and buildings, planted certain portions of the land, and took steps to extinguish outstanding rights of pasturage and turf cutting, in order that not only might they turn off the land every inhabitant and every person who might be entitled to go upon it, but, in order that they might further, as far as possible, diminish the inducement to anyone to do so, by making the place to a large extent uninhabitable. The land appeared to have been enclosed in a ring-fence when acquired. This fence was maintained, whether or not by any present acts of repair was not stated; but it appeared quite clear that the maintenance of the fence, just as the exclusion of trespassers, was part of the continuing purpose and policy with which the land was held. As they could not assume that the mere awe of the fact that the legal title was vested in the Corporation of Liverpool was enough to prevent wanderers in this wilderness, it appeared to be involved in the findings of fact that it was the present intention and the future right and policy of the Corporation to exercise any other form of control that might be convenient and necessary in the future to secure that, if trespassers made their appearance to any serious extent, they should not only be warned off, as they were at present by the gamekeeper of the lessee, but should also be prevented from coming on, should be physically excluded in case of need, and be punished by law if proof could be obtained. It was said in a passage quoted in the judgment of Mr. Worsley Taylor from one of the Corporation reports, that "any measures for preventing the pollution of the stream and reservoir must necessarily have for their object a considerable reduction in the resident population; and this can most advantageously be brought about by limiting the uses of the land to such purposes as sheep farming, forestry, and sporting." This showed that the intention of the owners of the land, wisely, was to combine, as far as possible, their principal object—the prevention of the pollution of the stream and the reservoir—with any subsidiary beneficial use of the area that might be open to them. Whatever might be now done, the hold which the Corporation were maintaining on the land of which they were legally in possession included in its objects the entrance upon it for various purposes, no doubt ancillary to the use of the land in connection with the gathering of water, but including among the limited uses those which would most advantageously, in the words of their report, prevent "the pollution of the stream and reservoir." Had the present case been in fact one of a derelict wilderness, which appeared to him to be the real pith of Mr. Balfour Browne's argument, possibly this circumstance in itself might constitute some rebuttal of any *primâ facie* evidence of occupation created by evidence of ownership. But it seemed clear that, though preserved in more or less a natural state, it was anything but derelict, and was, in fact, being used in pursuance of a highly intelligent policy, in a manner which involved the control and continuance of the control by the owners over it, and was quite inconsistent with the passing of occupation to any other person. Therefore, the answer to the first question put to the Court was that the Liverpool Corporation were in rateable occupation of the land, with the exception of the parts used by them for plantations and nurseries, as to which their rateable occupation was not in dispute. The other points were as to the amount at which they should be assessed, and as to the admissibility of evidence of the prime cost of the land used for these plantations and nurseries upon the question of the rateable value of the land. As to this, it was sufficient to say that the answer to the second and third questions was in the affirmative—that the plantations and nurseries should be assessed as the Court of Quarter Sessions had decided; and that the price paid for the gathering-ground was not evidence of the rateable value of the land used for the plantations and nurseries. These having been taken out of the gathering-ground and become a separate subject of rating, had to be rated as such; and the circumstance that they were bought at possibly a high price in connection with a water undertaking did not appear to him to enhance their value as plantations and nurseries. Accordingly, upon these two points the decision must be in favour of the respondents.

Mr. Justice AVORY delivered a shorter judgment to the same effect.

A discussion ensued on the question of costs; the result being that they were directed to be paid by the Corporation.

LIABILITY FOR DEFECTIVE STOPCOCK BOXES.

Batt v. Metropolitan Water Board.

This was an appeal by the plaintiff, Mrs. Florence Batt, asking that so much of the judgment of his Honour Judge Woodfall, given at the Westminster County Court on the 20th of October last, as directed that judgment should be entered for the defendants, with costs, might be set aside, and that in lieu thereof judgment might be entered for her for the sum of £30. The action was brought to recover damages in respect of defendants' negligence in not keeping or maintaining in proper repair a stopcock box in the highway of Amery Place, Old Kent Road. The box was placed in position by the Lambeth Water-Works Company; and it was contended that the defendants, in acquiring the Company's area, had taken over all their liabilities, including that of keeping these boxes in repair. The proceedings in the Court below were reported in the "JOURNAL" for Nov. 1 last (p. 341).

Mr. SIMNER argued that the learned Judge was wrong in law in holding that the defendants were not liable for the injuries caused to the plaintiff by reason of the non-repair of the stopcock box, or that it was their duty to maintain and repair the box; and, further, that he was wrong in law in holding that sections 8 and 19 of the Metropolitan Water Board (Charges) Act, 1907, relieved them of the liability to repair, as the Act was retrospective. Counsel referred to the cases of *Chapman v. Fylde Water-Works Company* (cited in the Court below) and *Rodocanachi v. Grand Junction Water-Works Company* (reported in the "JOURNAL" for April 5, 1904, p. 35) in support of his contention.

Mr. Justice RIDLEY said he understood the learned Judge had based his decision upon the Act of 1907.

Mr. ROSS BROWN said the contention on behalf of the Water Board was that before the Act of 1907 they were protected by the Metropolis Water Act of 1871, and the regulations made under it; but that if this did not protect them, they were protected by their Act of 1907.

Mr. SIMNER argued that there were no words in the Act of 1907 which made it retrospective.

Mr. Justice RIDLEY thought the learned Judge was wrong in holding that the Act of 1907 was retrospective.

Mr. Justice AVORY said if the judgment given in the County Court really proceeded upon the view that sections 8 and 19 of the Act of 1907 were retrospective, he could only say that he respectfully differed from the learned Judge, and with more regret differed from his brother Phillimore, who was alleged to have decided that this was the proper construction of the sections cited. Assuming that the Act of 1907 did not apply so as to impose a liability on the occupier to repair, and keep in repair, the stopcock box, the only question that really remained was whether there was any ground upon which this case could be distinguished from the position in *Chapman v. Fylde Water-Works Company*. That case was tried after the decision given in the Court of Appeal in *East London Water-Works Company v. Vestry of St. Matthew, Bethnal Green*, in which it was expressly laid down that the Company had the power, and were authorized by the General Act, to insert these stopcock boxes in the public streets; and that, so long as they inserted them, and maintained them in such a way as not to create a nuisance, the local authorities had no power to interfere with them. In other words, the Court of Appeal recognized the right of the Company to put down what might be some interference with the highway. In the Fylde case, it was clear the Court of Appeal decided that such things as these boxes were to be repaired by the Water Company; and when one became a source of danger, the Company were liable to be sued. It had been suggested that the general effect of the provisions was to make the fittings the property of the occupier of the house, and that he was liable for the repairs; and for this Mr. Brown relied on section 28 of the General Act of 1871. But the answer was that there was nothing in the case to show that the stopcock box was provided under that section, nor that any notice was served on the occupier, or that he provided the fittings. Having regard to the fact that the Act of Parliament was only intended to provide for a constant supply of water, and, for the protection of the Water Company that the necessary fittings should be altered, he very much doubted whether the Act of 1871, notwithstanding that the words of the definition clause were wide enough to include it, applied at all to the stopcock box in the present case. It had already been a matter of discussion and doubt whether the definition of "fittings" in the Act of 1871 would include a communication pipe outside the premises, or such a thing as a stopcock box. In the Colne Valley case, the Divisional Court held that property in the pipe was vested in the water consumers, but that they were not bound to repair.

The appeal was allowed, with costs.

On the application of Mr. Ross BROWN, their Lordships granted leave to appeal; the defendants to pay to the plaintiff at once the sum of £10 on account of the damages.

Opening Roads without Statutory Authority.

In the Chancery Division of the High Court of Justice last Friday, Mr. Justice Swinfen Eady had before him the case of *Attorney-General v. Hawkins and Another*. It was a case in which Mr. Macmorran applied for an injunction to restrain the defendants from interfering with and breaking up the roads in the area of the Padstow Urban District Council. He said the defendants had no statutory powers for the supply of gas, but had been doing this for many years, and the mains, which were laid a long time ago, were continually getting out of repair, and necessitated constant interference with the streets. The Local Authority did not wish to interfere unduly with these people, if they would relay the mains so as to avoid constantly breaking up the streets; but they were compelled to take action now, as notice had just been given by the defendants of their intention to open a certain street to repair a leakage, and also to lay a new main. Mr. Dighton Pollock intervened at this point, saying he had reason to believe that he would be instructed to appear for the defendants, and to give an undertaking. His Lordship said he would grant the injunction as asked over next motion day; and then, if Mr. Pollock were instructed to give it, an undertaking might be substituted.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

The Half-Yearly Meeting of the Company was held last Friday, at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES HUNT in the chair.

The SECRETARY (Mr. Chas. M. Ohren) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

A "RESIDUALS" HALF YEAR.

The CHAIRMAN, in moving the adoption of the report and accounts, said that the half year to which they related deserved to be called a "residuals" half year; for it seldom happened in the history of a gas undertaking that, as in this instance, an all-round and substantial increase in the returns for residual products had to be recorded. Residuals, as the proprietors knew, played a very important part in the economy of gas manufacture. Ordinarily, they might be relied upon for returning about one-half to five-eighths of the cost of coal—that was to say, for every 20s. spent on coal, from 10s. to 12s. 6d. was returned in the shape of coke, tar, and sulphate of ammonia. This half year, however, they had got back about 14s. 6d. for every 20s. spent on coal—the total increase of revenue from these sources amounting to nearly £5000. Whether this increase, or any portion of it, would be permanent was more than anyone could say. What they did know was that both tar and sulphate of ammonia in times gone by fetched not only much higher, but also much lower prices, than those of to-day. While they might hope for the best, there was always the possibility of a reaction. He thought it was in the early eighties that tar fetched as much as from 50s. to 60s. per ton, or from two-and-a-half to three times as much as now—this great rise following upon the discovery by Perkin and others of the very attractive products to be derived from it. This high level of prices did not last long, and was succeeded by more or less acute depression, which endured for some years. Now there had come a moderate revival in prices, which was partly due to increasing requirements for road-making purposes. It was understood that the Road Development Board had decided to authorize considerable expenditure in this direction; so that the outlook might be regarded as favourable, seeing that the wider the market the better must it be for prices all round. The value of sulphate of ammonia also reached some years ago much higher figures than those of to-day; these being followed, as in the case of tar, by much lower ones. The partial eclipse of this product for a fairly long period was to be attributed to competition of a double kind—from without, in the shape of nitrate of soda; and from within, in the shape of over-production. High prices brought about production from sources other than gas-works, such as recovery coke-ovens, and in particular Germany, which was at one time the principal market for sulphate, now took the lead in its production. Fortunately, new markets had arisen to more than redress the balance of the old; and the present improvement was attributable to the growing needs of America and Japan. In this connection, a word of acknowledgment was due to the Sulphate of Ammonia Committee (to which the Company subscribed) for their services in bringing under the notice of agriculturists and others the advantages of the product as a fertilizer, and in spreading information as to the best way of using it. This had been very uphill work in the face of the increasing production, and the apathy of possible users. But the efforts made by the Committee could not but have contributed—perhaps materially—to the very satisfactory increase in the demand which was now being experienced.

INCREASED SULPHATE AND COKE PER TON OF COAL CARBONIZED.

As mentioned in the report, a part—in fact, a substantial part—of the improvement in the receipts under this head was due to an increase in the quantity of ammonia per ton of coal carbonized. It always gave the Directors very great pleasure to notice any improvement of this kind, whether in the methods of manufacture or in any of the many operations involved in the supply of gas to the consumer; and their Engineer (Mr. S. Y. Shoubridge) was always ready to give credit where credit was due. Another satisfactory feature of the half-year's working was a small increase in the quantity of coke made for sale—in other words, a reduction in the amount used for heating the retorts and other manufacturing purposes. This was one of the small economies which betokened careful management, and which might be said to spell success. Coke was the most important residual; and about three-fifths of the total increase in the revenue under this head was derived from it. It was an interesting and important fact that the rise in value which this represented had occurred in the face of the falling prices for coal. Various causes had been assigned for this, apart from the artificial rise in the price of coal last year—such as improved trade, and a shrinkage in the supply owing to the greater yield of gas per ton of coal which was now being obtained. These had no doubt been helpful. But there was still another cause, which deserved to be mentioned, and that was the growing endeavour, on the part of gas managers throughout the country, to dispose of the product in their own localities, instead of, as formerly, sending large quantities to distant markets, already perhaps over-supplied. It was now by no means so uncommon as it once was to find nearly the whole of the production absorbed in this way; and this seeking out of fresh customers, and the broadening process which it implied, could not but be productive of good effect. The Directors and the Company's officers recognized, and were endeavouring to fulfil, the obligation which lay upon them in this respect.

COAL PRICES AND COST OF DELIVERY.

A small increase in the sales of gas had been usefully supplemented by a saving in the cost of the delivery of a portion of the coal supplies. The cost of delivery was a serious item, and was engaging the very careful attention of the Board, with a view to its reduction. They would do their utmost to at least make permanent the advantage already secured. A further improvement in the yield of gas per ton had also to be recorded; while in regard to the future, there was reason to expect that next year's supplies of coal would be obtained at somewhat less than last year's rates. The Coal Mines Regulation (Eight Hours) Act did not seem likely to permanently affect prices to the extent that was apprehended; and the great development of the Yorkshire coalfield, which was referred to by the Chairman of the Great Northern Railway at the recent meeting of that Company, gave promise of a good supply of coal as far as concerned the immediate future. But there was always the possibility of a boom in trade upsetting all their calculations.

INCREASED BUSINESS AND LOCAL CONDITIONS.

He was glad to say that the number of consumers showed a substantial increase, notwithstanding the present comparatively slow growth of the districts supplied by the Company. Of late years, the trend of London's population had been in other directions, following upon improved means of communication. But it was hoped that the electrification of railways and extensions of the tramway system which were now proceeding in South London would have a similar beneficial effect there. Considerable progress had been made in extending the use of gas-heating appliances of all kinds—the account period having been the busiest ever experienced by the Company in this respect. In particular, the number of gas-fires fixed during the half year considerably exceeded that of the corresponding half of the previous year, which up to that time was the highest. It was clear that the public were fully impressed with the great advantage and cleanliness of this mode of heating, the demand for which, although largely dependent upon the weather, and consequently intermittent, could not but favourably affect the future.

LIGHTING—SHOP, STREET, AND OTHERWISE.

For lighting purposes, also, they were more than holding their own, and outside shop lighting, to which he referred at the last meeting, was becoming a prominent feature of the lighting business. Not only was incandescent gas light preferred by many to electricity for this purpose, but it could also be supplied, light for light, on more favourable terms than the rival illuminant. The Directors were in negotiation with one or two of the local authorities within the Company's area of supply for improving and modernizing their street-lighting arrangements, and were, he need hardly say, prepared to render them every assistance in this direction. He should come presently to what they were about to do to bring under notice the great advantage of high-pressure lighting, of which there were already some excellent examples in the neighbouring districts of the South Metropolitan Company, to say nothing of the brilliant lighting by this means in the City of Westminster by the Gaslight and Coke Company. The latter had been described, and fitly so, by an independent authority as being "not only efficient and economical, but beautiful and powerful, without being painful, is splendidly diffused, and has the very valuable characteristic of being fog-piercing to an unusual degree." This combination of advantages had been secured by the ratepayers with a saving in cost of no less than £8000 per annum, as compared with electricity of the same candle power. High-pressure gas, he might say, was economical not only for lighting, but also for many industrial purposes—that was to say, for furnace work of various kinds. The Corporation of Birmingham had set the example of distributing it on a large scale in the manufacturing quarters of the city, and with every prospect of success.

RESULTS OF THE HALF YEAR.

The results of the half-year's trading might be summed up in a very few words. Sufficient profit had been made, after satisfying all charges, to enable the Directors to recommend the payment of dividends at the same rates as for the two previous half years, making the third in succession at the highest rate of sliding-scale dividend ever paid by the Company, and the highest permissible with gas at its present price. This was after discharging certain obligations to capital account in respect of plant and buildings which had become obsolete—a policy which the Directors were satisfied would commend itself to the proprietors. If their recommendation were adopted, there would be carried forward to next half year a slightly increased balance.

CO-PARTNERSHIP.

For this continued success, the Company were, in no small degree, indebted to the hearty goodwill and co-operation of the staff and employees of all grades, fostered and encouraged by the system of co-partnership, of which this Company had reason to be proud of having been, under the leadership of Sir George Livesey, one of the pioneers. He might say that the Board had been much gratified by the re-election of Mr. W. G. Waller as Employee-Director; he having occupied that position for several years, with advantage to the Company. Both he and his colleague, Mr. Ross, had proved to be most useful members of the Board, in the deliberations of which they greatly assisted. The Board were very glad of this opportunity to renew their testimony to the great value of this important feature of the co-partnership system. Mr. Waller now occupied on the works the position of General Foreman, the previous occupant of which retired last year on superannuation, after many years of service. He (the Chairman) was glad to say that Mr. Waller had already shown himself to be "the right man in the right place."

LIGHTING OF THE FESTIVAL OF EMPIRE EXHIBITION.

There was but one other matter which it seemed necessary to mention, but this was, in some respects, the most important of all. Towards the end of last year, it came to the knowledge of the Board that extensive preparations were being made by a very important and influential Committee to hold during the present year a "Festival of Empire Exhibition" at the Crystal Palace, the details of which were now becoming public. As the Company had lighted the Palace from the very beginning, and were naturally much bound up in its success, the Board were desirous of assisting, as far as might be in their power, to make the Exhibition a success, and accordingly application was made to the Committee for permission to submit to them certain proposals for lighting, in accordance with plans already prepared. The application

was acceded to; and the Company's offer was made in terms sufficiently favourable to secure its acceptance. They had undertaken to light the grounds of the Palace and about one-half of the Palace itself with about 200 high-pressure incandescent gas-lamps of from 1000 to 4500 candle power each, similar to those being used in Westminster. The other half of the Palace was not included in the tender; and this would be lighted by electricity, which would enable the public to compare the two illuminants. The Company were also to provide three large gas-engines, having an aggregate capacity of 2750 H.P., which would enable the Exhibition Committee to generate the whole of the current they would require for lighting the interiors and exteriors of the new buildings now in course of erection, and for other purposes—their object being to demonstrate to large users of electricity the comparative cheapness of generating current by means of town gas. This illumination of the extensive grounds of the Palace and a generating-station on so large a scale with gas as the motive power would form prominent and interesting features of the Exhibition. The work was well in hand; and everything was being done by Mr. Shoubridge and those working under his direction, and also by the manufacturers of the plant and apparatus, to ensure its being in every way a complete success. It would no doubt be understood that arrangements of such magnitude of their kind carried with them somewhat exceptional responsibilities—financial and otherwise. The Directors, however, had not hesitated to incur these in the furtherance of what they believed to be the best interests of the Company; while at the same time they had not been unmindful of those wider interests of which every gas undertaking was more or less the custodian. From what they knew of the preparations, the Exhibition ought to be a very great success, in which case the Board's action with regard to it would have been more than justified.

The Adoption of the Report.

Mr. Robert Morton, in seconding the motion, remarked that they had listened, and he was sure with satisfaction, to the very lucid explanation given by the Chairman of the report and all other matters which were of interest to the Company.

No questions being asked by shareholders, the resolution was put and carried unanimously.

The Dividend.

The Chairman said the next motion was one which should have been proposed by the Deputy-Chairman (Mr. Jabez Light), who, however, was unfortunately absent through ill-health. He therefore would himself move that a dividend for the half year ended Dec. 31 last be declared at the rates per annum of 5 per cent. on the preference stock and 5¾ per cent. on the ordinary stock, less income-tax.

Mr. W. G. Waller seconded, and, in doing so, remarked that the workmen wished him to convey to the proprietors their grateful thanks for the many blessings bestowed upon them through the system of co-partnership, which he was pleased to say was as strong and as healthy to-day as ever.

The resolution was agreed to.

Re-Elections.

Mr. Charles Carpenter proposed that Sir J. Fortescue Flannery, Bart., M.P., an outgoing Director, be re-elected a Director of the Company. It was, he said, unnecessary to introduce Sir Fortescue to the shareholders. He was a public man in the broadest sense of the word, and as such was known to them and to a larger public than the shareholders of the Company; and the high opinion with which that public regarded him was shared by his colleagues on the South Suburban Board, whose knowledge of him and whose friendship were much more intimate.

Mr. Morton seconded; and the proposal was agreed to.

Sir Fortescue Flannery, in returning thanks, remarked that he had been a Director of the Company for a good many years, and every year he felt more satisfaction in the work that was being done, because every year he became more and more convinced that they were doing a splendid work as pioneers of the great system of co-partnership. He did believe that history would show that this Company and others associated with it under the late Sir George Livesey would inaugurate a new era of a social character in this country. Therefore it was a satisfaction and an honour to continue a Director of the South Suburban Gas Company. He rejoiced in its prosperity, which was absolutely sound and good, and in the excellent feeling which existed between the Directors, the officials, the staff, and the shareholders. He then moved the re-election as a Director of Mr. John Boraston. The proprietors, he said, must think they were forming a Board of mutual admiration; but it was enormously in the interest of the shareholders that the Directors should esteem each other and get on well together. It was one of the characteristic features of this Board that they worked in perfect harmony.

Mr. G. Ross said it gave him great pleasure to second the proposition, for the simple reason that he knew of no better man than Mr. Boraston to fill the position.

The resolution was carried.

On the motion of Mr. T. Wilkins, seconded by Mr. T. P. Fisher, Mr. Thomas Guyatt was re-elected an Auditor of the Company.

Votes of Thanks.

Dr. Turner, in proposing a vote of thanks to the Chairman and Directors for their services during the past half year, remarked that the shareholders had had a most satisfactory report, and were to receive the same dividend as last year—the most that could be paid. They had heard with pleasure that the number of consumers of gas had increased, though only to a slight extent. They had been told that this report was a "residual report." Well, the residuals tar and sulphate of ammonia were likely in future, he thought, rather to increase in demand than to diminish. Motor-cars were rapidly growing in numbers; and they required tar-paved roads. So they might hope that the consumption of gas tar would at all events not be less in the future. As regarded sulphate of ammonia, there was an enormous amount in use as a fertilizer; and as the earth's products diminished the amount of chemicals in the earth, so they must be replaced by others. America and Canada, and other countries which were more or less becoming exhausted of their chemical fertilizing elements, must replace them artificially; and thus the probability was that the consumption of sulphate of ammonia would go on increasing. They had heard a great deal about the Festival of Empire Exhibition at the Crystal Palace; and he had no doubt in his mind that it would be very successful. They had been told that the South Suburban Gas Company had been one of the pioneers in the co-partnership movement. He thought they would prove that they had been one of the pioneers in showing people that high-pressure gas was better than electricity. It was a very wise thing that the Directors should not have agreed to light the whole of the Palace and the grounds, but only part, and to let the other portion be illuminated by electricity. By this means, the public would be enabled to form their own opinion as to the relative merits of the two systems of lighting. There could be no question as to the value of gas for illuminating streets, on account of its greater fog-piercing capacity; and he thought also there could be no doubt as to its advantages for lighting large buildings like the Crystal Palace. Other gas companies should feel much indebted to the South Suburban Company for what they were doing.

Mr. H. Gundry seconded, and said that everything the Directors had done had been well done. Improvements had been effected in various directions which reflected credit, not only on the Board, but on the staff as well. They saw around them gas getting the better of the battle with the electric light. This year, he believed, would be a better year than ever for gas; and they might rest assured that whatever turned up their Directors would take the utmost advantage of it.

The vote having been heartily accorded,

The Chairman acknowledged it on behalf of himself and his colleagues, and then proposed a similar vote to the officers and employees of all grades for their attention to the affairs of the Company. He had, he remarked, already said that much of the success of the business was due to their zeal and fidelity. Therefore he need only add that the Directors felt themselves greatly indebted to them all for their continued active co-operation.

Mr. Morton seconded the proposal, which was unanimously carried.

Mr. S. Y. Shoubridge, the Engineer, acknowledging the vote on behalf of himself and his staff and the workmen, said he thought he could truthfully state that the employees had done what they could, and not what they would. Supported and encouraged as they had been by the Directors, it was impossible for them to have done less. They only wished they could have done a great deal more.

Mr. Ohren also briefly acknowledged the vote, on behalf of the secretarial department.

CROYDON GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Friday, at the Offices, Katharine Street, Croydon—Mr. Charles Hussey, J.P., in the chair.

The Secretary (Mr. W. W. Topley) read the notice convening the meeting; and the report and accounts were taken as read.

The Chairman, in moving the adoption of the report and accounts, said he was glad to be able to state that the accounts were, in the opinion of the Directors, the best they had been able to submit for many years—perhaps the best the Company had ever had; and this, whether they looked upon them from the point of view simply of the half-year's trading, or as indicating the probable course of the Company's business fortunes in the immediate future. In all branches of the Company's work, steady and satisfactory progress was being made.

Capital Expenditure.

For some six years now, the proprietors would have seen that capital expenditure, often to a considerable extent, had been incurred on the Company's works and plant. This had been due, as he had from time to time explained, to the construction and equipment at Waddon of what was practically a new works there side by side with the old. Necessarily gas-works' construction must precede by a considerable time the demand which it was designed to meet. As a consequence, they had had for some time past to find out of current revenue interest on large sums of capital laid out with a view to the needs of the future. Now the capital outlay on manufacturing plant need not, for some time to come at all events, be of any great amount; and as the sales of gas increased, they looked to reap the benefit of the comparatively lean years they had successfully passed through. He spoke, it would be noted, only of capital expenditure on manufacturing plant. The Directors neither anticipated, nor desired, that there should be any slackening in the growth of the distribution system, which naturally kept pace with the growth of the business.

Increasing Business.

In the half year they had increased the sales of gas by 3·70 per cent.; and this represented an aggregate increase in sales at the rate of some 47 million cubic feet per year—a by no means inconsiderable quantity, and, he might say, as much as some small works turned out in a year. The number of consumers had increased in the half year by 1067; and they knew of 1954 more gas-stoves in use in the district than they did six months ago. Public appreciation of the usefulness of gas-fires and cookers was steadily growing; and as gas became cheaper they might, he thought, confidently look for this tendency to be maintained and increased. The growth of the Company's undertaking during recent years, both in magnitude and complexity, caused, as would easily be seen, a great increase in the number of transactions recorded in the accounts; and the Directors therefore commended to the favourable consideration of the proprietors a proposal which they hoped would be laid before them dealing with the remuneration of the Auditors.

New Retort-House Plant.

The chief feature of the half year, so far as the manufacturing operations were concerned, had been the starting, in the autumn, of work in the reconstructed No. 2 retort-house, with its new equipment of machine-stoking and coke-handling plant; the latter possessing several features

of novelty. In particular, the machine for pushing coke from the retorts had worked in a very satisfactory manner. Such initial difficulties as must be looked for when plant of a novel type was put to work either had been surmounted, or were in the way to be overcome; and as would be seen, economy had been maintained in the manufacturing costs.

THE DISTRIBUTION DEPARTMENT.

It was, however, to the distribution and sales departments that gas companies nowadays had to look for work as important as, if not more important than, the manufacture of the gas sold. In this direction also, they had every reason to be satisfied with the position and prospects. Little that was absolutely novel had been done; but the distribution department, under the management of their energetic Superintendent, continued to bring the best appliances for using gas under the notice of existing consumers and prospective consumers. Quite often the result of their efforts was—while giving consumers far better results, in light or heat, than were obtained before—to effect an actual reduction in their accounts. The fact should not be lost sight of, when considering the increases in the sales of gas, that the value obtained from it by the consumers was greater out of all proportion than the increased quantity sold. One interesting departure he might mention. They had adopted the system of lighting business premises on the high-pressure system at moderate inclusive charges, covering the supply of the lamps and other apparatus, gas, maintenance, lighting, and extinguishing, so that the customers had no trouble whatever. Several installations had been completed—notably, at South End, Croydon, and near the tram terminus at Purley. The value of this service was coming to be recognized by shopkeepers, and would, the Directors believed, be largely extended in the early future.

EXHIBITION AT SHEPHERD'S BUSH.

He was glad to be able to tell the proprietors that arrangements had again been made by a number of gas companies in and near London (of whom the Croydon Company were one) to hold a joint gas exhibit at the Coronation Exhibition at Shepherd's Bush in the summer. The exhibit last year attracted the attention of large numbers of visitors, many of whom were put into communication with the local gas undertakings. It was hoped the exhibit this year would be even more successful from an advertising point of view, while the cost would be less, as the stand used last year would be again available.

JOINT PUBLICITY.

At the last meeting, he referred to a project for organized advertising by gas companies, and pointed out how suitable the industry was for common action between them, whereby the most effective results could be obtained for the benefit of all at the least expense to each. He was glad now to be able to tell the proprietors that a Publicity Committee had been formed jointly by the Institution of Gas Engineers and the Commercial Sections of the District Associations of the country. The Committee was an influential and representative one. If adequately supported by contributions (proportionate to their size) from a sufficient number of companies, the Committee would undoubtedly be able to do a work of the greatest value ot the industry in bringing the uses and advantages of gas prominently to public notice. He ventured to express the strong hope that such a measure of support might be forthcoming as would, in the opinion of the Committee, justify them in commencing operations at an early date. Their action should be supported by all who would benefit from the work; and they might, he thought, reasonably hope that the usefulness would be soon so demonstrated that if gas companies had now any doubts as to the wisdom of supporting the Committee, these doubts would quickly disappear.

POINTS FROM THE ACCOUNTS.

Inviting consideration to the accounts, he said it would be observed that there had been an increase of about £1000 in the cost of coal and oil, which was rather less than proportionate to the increase in the sales. On the other side of the account, there had been a relatively much larger gain—over £4500—in the receipts from residuals. The revenue from gas was higher by £1200; and but for the reduction in price to 2s. 7d. at Michaelmas last, it would have been more by about another £2000. Rentals of meters, stoves, and fittings went up with the increase of the consumers, and their extending use of stoves; and under this heading, there had been received £500 more for the half year. Altogether the earnings of the half year exceeded by £7990 the amount required for dividend. Of this surplus, £2000 had been carried to the reserve fund, and £1000 to the insurance fund; and the investments of these funds in Consols had been written-down to 80. A sum of £1000 had been added to the renewals fund. A commencement had also been made in dealing with the old works at Caterham by writing off £2000 there—leaving, after payment of dividends, a carry-forward of £11,661, or £1990 more than last half year.

EXCELLENT PROSPECTS.

What he had just said related to the past. Now he wished to invite attention for a moment to the future. So far as the current half year was concerned, indications seemed to point again to results generally similar to those of the period just ended. The contracts now running for coal and oil were the same as last half year, and residuals so far were doing well. Looking further forward, they were entitled to expect some saving from the fact that they had been able to make contracts for 1911-1912 for coal and oil at prices somewhat lower than they were now paying. The markets for coke and sulphate had every appearance of being good. As confirmation of this, they had just made a sale of sulphate at above £2 more than at this time last year. The Directors had also reason to hope that some further improvement might be experienced in the prices realized for tar.

REDUCTION IN PRICE.

This being the outlook for the immediate future, the Board felt they would be justified in making as from Lady-day a further reduction in the price of gas; and they proposed accordingly to reduce this to 2s. 6d. per 1000 cubic feet—the lowest price touched in the history of the Company, and a result he and his co-Directors had long hoped for. The two reductions of the last six months would mean a saving in the consumers' accounts of just under £12,000 per annum, with, of course, a like reduction of revenue to the Company. The Directors believed this reduction would be appreciated, and would tend to further popularize the use of gas, and so increase the consumption. The Company's employees would, under the co-partnership scheme, also benefit as a consequence of these reductions. The Directors gladly recognized and acknowledged the efforts made by the staff and workmen as a whole towards the extension of the Company's business on the one hand, and economy and efficiency of work on the other. They felt assured that these efforts would be in the future maintained and even increased.

The DEPUTY-CHAIRMAN (Mr. Thomas Rigby) seconded the motion.

SHAREHOLDERS' REMARKS.

Mr. A. W. OKE spoke of the excellence of the report, and also congratulated the Directors upon their decision to join in the exhibition at Shepherd's Bush. Personally, he did not think gas companies had done sufficient in the way of advertising. He was therefore glad, and he was sure the shareholders generally would be glad, to hear that the Directors were likewise joining in the general publicity scheme, which must benefit not only this Company, but gas companies generally. It would be welcome news to the residents in the town to know that they were to have gas at 2s. 6d., which seemed to him, for an inland town like Croydon, to be a record price. There need be no apprehension on the part of the proprietors as to their dividends with such an excellent report before them, and with reserves written-down almost as low as those of any banking concern in the country.

Mr. BROWN also believed that the reduction in price would lead to a great acquisition of business.

Mr. F. H. PILLEY said he thought he voiced the sentiments of the meeting, in expressing the great satisfaction with which the proprietors received the excellent report. A better report he did not think he had ever listened to. In addition to the good work that had been done, the Directors had boldly written-down wherever it had been possible to do so, so that should the Company unfortunately at some future date be not so successful as at present, they would have something substantial upon which to fall back.

The motion was unanimously carried.

DIVIDENDS, AND MR. HELPS' ILLNESS.

Mr. CORBET WOODALL proposed the declaration of dividends at the rates per annum of 14½ per cent. on the "A" stock, 11½ per cent. on the "B" and "C" stocks, 5 per cent. on the "D" stock, and 10 per cent. on the "E" stock, all less income-tax. In doing so, he said he had satisfaction in proposing this resolution, because the dividends had not only been well earned, but they were also well secured. Mr. Oke had referred to the reserves of the Company. As a matter of fact, they had been written-down so that they represented the actual value they would fetch if they had to realize them. Altogether they had now funds in hand amounting to approximately one-and-a-half years' dividends. But the dividends were not only secured by these reserves in cash, they were secured also by works that were well in advance of the needs of the day. They were, indeed, quite capable of meeting the increase that was anticipated for some years to come, without any considerable further extension of capital. Not only were the works sufficient in size, but they were well up to date. They had been well designed and well executed; and in these respects they also gave the proprietors good security. The cost, too, of manufacture would be reduced rather than increased in the future, so the dividends were still further guaranteed. He had had the pleasure of going over the works that day; and he felt they might take certain satisfaction from the fact that while their General Manager (to the universal regret of the Directors and of the proprietors, and he thought of the town of Croydon also) was necessarily away from them at the present time, the works were going on as well as if he were present. He thought it was a tribute to their General Manager that the works did as well in his absence as in his presence. He did not say this in any disparagement of their Resident Manager (Mr. Caddick). The organization of the works was as good as it could be; and they could congratulate themselves upon the position of the Company.

Mr. WILLIAM CASH seconded the motion, which was adopted.

Moved by the CHAIRMAN, and seconded by Mr. SAMUEL SPENCER, Mr. Thomas Rigby was re-elected to his seat at the Board.

The CHAIRMAN next moved the re-election of Mr. Corbet Woodall, remarking that it was a great honour to have the Governor of the largest Gas Company in the world, and a gas engineer of such eminence, as a member of their Board.

Mr. PERCY H. HALL seconded the motion, and it was heartily agreed to.

On the proposition of Mr. SAMSON, seconded by Mr. PILLEY, the retiring Auditor (Mr. John Jones) was re-appointed.

Moved by Mr. MAITLAND, and seconded by Mr. W. EDGAR, the fees of the Auditors (Mr. J. C. Benwell and Mr. John Jones) were raised to £200 per annum.

The CHAIRMAN, in this connection, remarked, as an illustration of the amount of work that had accrued, that there were now more than 1600 stockholders, while seven years ago they had about 1000.

Mr. BENWELL having duly acknowledged the resolution on behalf of himself and his colleague,

A hearty vote of thanks was passed to the Chairman and the Board, on the motion of Dr. STRONG, seconded by Mr. BROWN.

The CHAIRMAN, acknowledging the motion, remarked that, from present appearances, the Board were justified in hoping that for the current half year they would be in a position to give as good a report as they had for the past one. Proceeding, he moved a vote of thanks to the whole of the officers, their staffs, and the employees generally. He observed that the proprietors would have missed a familiar face from the meeting. Unfortunately, their Engineer and General Manager (Mr. J. W. Helps) was not in good health; and he (the Chairman) was sure they all hoped it was only temporarily. The Board had sent Mr. Helps away, as he was sure the proprietors would all have wished them to do, for a change and rest; and they trusted he would come back restored in health to resume his activity as usual. Mr. Caddick had

stepped into the breach; and, as Mr. Woodall had said, the works being in such an efficient state, and Mr. Caddick being so accustomed to them, he was able to carry them on with equal efficiency during Mr. Helps's absence as during his presence. The Board were pleased to testify to the personal attention Mr. Caddick was giving to the work at Waddon; and they were quite satisfied with the way all things were going on. Mr. Topley's work, too, had grown enormously; but nothing had been too much for him. He (the Chairman) had spoken in his address of the energetic way in which the Superintendent of the Distribution Department (Mr. Sandeman) had worked. Then in Mr. Anderson they had a splendid assistant to Mr. Topley; and in Mr. Haines, the Chief of the Rental Department, they had a good man. Referring to the co-partnership scheme, he spoke also of the excellent spirit and good feeling that existed among the employees.

Mr. SPENCER seconded the motion, and it was heartily passed.

A telegram had been received from Mr. Helps conveying his best wishes for a successful meeting; and, on the suggestion of the Chairman, it was decided to telegraph Mr. Helps saying how sorry the proprietors were to learn of his indisposition, and wishing him a speedy recovery to health.

SHEFFIELD UNITED GASLIGHT COMPANY.

Annual Report and Accounts.

In the report to be presented by the Directors of this Company at the ordinary general meeting on the 13th prox., they state that by the Order obtained last session the Company were authorized to hold meetings annually instead of twice a year. The accounts accompanying the report therefore cover a period of twelve months. The business of the Company continues to progress satisfactorily. The consumption of gas for the six months ended June 30 showed an increase of 4·01 per cent.; and, owing to the cold and dull weather, and the great improvement of trade in the town generally, an extra quantity to the extent of 6·79 per cent. was sold during the six months to Dec. 31—the total increase for the whole year being 190,045,000 cubic feet, or 5·44 per cent. The price of gas during the twelve months was 1s. 4d. to 1s. per 1000 cubic feet, according to consumption, and at the latter rate for gas-engines. The average price was 1s. 2·94d.

The accounts accompanying the report show that the sale of gas in the past year produced £227,146, the rental of meters and stoves came to £19,306, residuals brought in £141,887, and the total revenue was £391,165. The expenditure on the manufacture of gas amounted to £233,711 (coal costing £135,259, and repair and maintenance of plant £55,850); distribution, £27,977; management, £12,652; rents, rates, and taxes came to £20,284. The total expenses were £297,674. The amount carried to the profit and loss account is £93,491; and the balance on this account is £122,352. An interim dividend of 5 per cent. for the half year ended June 30 was paid in September; and after providing for the dividend for the December six months, there will remain a balance of profit on the year's working of £6486, from which amount the Directors, following the example of the large banks and other gas undertakings, have decided to take £2533 to write-off depreciation on the reserve fund investments. There will be a balance of £3953 to be added to the amount carried forward from previous accounts.

CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

Amalgamation with the Gaslight and Coke Company Approved.

The Annual General Meeting of this Company was held last Wednesday, at the Offices at Woodford—Mr. THOMAS KEEN (the Chairman) presiding.

In the report presented by the Directors they stated that the sale of gas continued to show a satisfactory increase. A reduction of 1d. per 1000 cubic feet was made in the selling price at Midsummer last; and it is proposed to make a further reduction of 2d. forthwith. The accounts accompanying the report showed that the total revenue last year was £26,377, compared with £24,956 in 1909, and the expenditure £18,030, against £17,527. The balance carried to the profit and loss account was £8347, compared with £7428; and the amount available for distribution was £9567, against £7816. The Directors recommended the payment of a dividend at the rate of 3 per cent. for the six months ended Dec. 31; making with the interim dividend 6 per cent. for the year, less income-tax.

The CHAIRMAN, in moving the adoption of the report, expressed his pleasure at meeting the proprietors again after a successful year's trading. He said the sale of gas amounted to 118½ million cubic feet—an increase of 7·36 per cent.; and 505 new consumers and 387 new cookers had been connected up and 75 gas-fires sold during the year. The residual products had appreciated in value all round. On the expenditure side of the revenue account, coal had cost rather more; and rates and taxes were up, as usual. The other items in the account did not need comment, as they were on the ordinary lines; and the works and distributing plant, under the careful superintendence of the Manager (Mr. F. Smallbone), had been well maintained. Notwithstanding the further reduction made in the price of gas, the balance carried to the profit and loss account was £1000 higher than it was this time last year. He felt sure the results of the year's work would be as heartily received by the stockholders as they had been by himself and his colleagues.

The motion was carried unanimously; and the dividend recommended was declared.

At the conclusion of the ordinary business, an extraordinary general meeting was held, at which the Secretary produced the Bill authorizing the acquisition by the Gaslight and Coke Company of the undertakings of the Barking and Chigwell Gas Companies, and gave details of the initiation and progress of the negotiations which led to the signing of the preliminary agreement.

On the motion of the Chairman, the usual resolution approving the Bill was unanimously carried.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report for the six months ended Dec. 31 last which the Directors of the Commercial Gas Company will present at the half-yearly meeting on Thursday.

The revenue account shows a net profit for the half year of £72,980 12s. 5d., which, added to the balance of £43,763 10s. 5d. brought forward, produces a net revenue balance of £116,744 2s. 10d. Deducting therefrom £8415 9s. 1d. for interest, there remains standing to the credit of the net revenue account a balance of £108,328 13s. 9d. available for dividend. The Directors recommend the payment of dividends at the rates of £5 9s. 4d. per cent. per annum on the 4 per cent. stock of the Company, and of £5 6s. 8d. per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on the 31st of December amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £149,298 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed, out of the £550,000 authorized. Capital account receipts amount, with premiums, to £2,606,065 4s. 5d. The expenditure stands at £1,449,972 0s. 9d., with a nominal amount of £1,212,812 10s. added by conversion—together, £2,662,784 10s. 9d. There is consequently a balance of £56,719 6s. 4d. carried to the balance-sheet. The net expenditure on capital account in the half year was £2964, apportioned as follows: New and additional mains, services, &c., £1342; stoves, £1081; prepayment meters and fittings, £541. The reserve fund amounted at the close of the year to £35,631; and the insurance fund to £32,012. The following is the

REVENUE ACCOUNT.

Expenditure.

Manufacture of gas—			
Coal and oil, including dues, carriage, unloading, and trimming	£89,205 10 3		
Salaries of Engineer and officers at works	2,699 3 11		
Wages (carbonizing)	11,200 14 1		
Purification, including labour	1,338 4 8		
Repair and maintenance of works and plant, materials and labour (less £483 10s. received for old materials)	31,642 13 11		
		£136,086 6 10	
Profit sharing		3,296 4 0	
Distribution of gas—			
Salaries and wages of officers (including rental clerks)	£4,787 7 11		
Repair, maintenance, and renewal of mains and services, material and labour	5,746 6 6		
Repair and renewal of meters	2,421 2 9		
" " " " stoves	9,418 17 5		
" " " " prepayment meters and fittings	11,052 3 7		
Incandescent mantle maintenance	634 7 9		
		34,070 5 11	
Public lamps—lighting and repairing		2,484 11 0	
Rent, rates, and taxes		12,742 19 7	
Management—			
Directors' allowance	£1,250 0 0		
Company's Auditors	75 0 0		
Salaries of Secretary, Accountant, and clerks	1,275 4 6		
Collectors' salaries and commission	1,668 1 6		
Prepayment meter collection	3,093 16 9		
Stationery and printing	1,041 14 7		
General charges	1,858 19 1		
		10,262 16 5	
Bad debts		996 2 9	
Law and parliamentary charges		294 10 8	
Superannuations and allowances		1,267 12 0	
Official officers, &c.		95 1 0	
Total expenditure		£201,596 10 2	
Balance carried to net revenue account		72,980 12 5	
		£274,577 2 7	

Receipts.

Sale of gas—			
Per Meter (No. in use 103,192) at 2s. 4d. per 1000 cubic feet	£190,806 15 7		
Public lighting and under contracts	5,665 9 7		
	£196,472 15 2		
Less discounts and allowances	3,679 7 8		
		£192,793 7 6	
Rental—			
Meters (23,753)	£2,8 6 9 1		
Stoves (63,328)	10,092 4 11		
Prepayment meters (78,673)	15,909 10 4		
Incandescent mantle maintenance	634 12 10		
		29,472 17 2	
Residual products—			
Coke, less £3886 6s. 2d. for labour	£32,308 8 10		
Breeze, less £1019 19s. for labour	1,412 10 10		
Tar	7,664 14 9		
Ammoniacal liquor and sulphate of ammonia	10,879 6 0		
		52,265 0 5	
Miscellaneous receipts—			
Rent receivable	£14 12 6		
Transfer fees	31 5 0		
		45 17 6	
Total receipts		£274,577 2 7	

The following are the statements relating to the manufacturing operations of the Company in the half year:—

Statement of Coal and Oil.

—	In Store June 30, 1910.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store Dec. 31, 1910.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	25,352	97,547	100,214	665	22,020
Oil—gallons . .	369,061	1,439,047	1,277,826	..	530,282

Statement of Residual Products.

Description.	In Store June 30, 1910.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1910.
Coke—tons	2,525	61,381	10,826	48,897	4,183
Breeze—tons.	3,376	9,169	..	9,479	3,066
Tar—gallons	558,069	1,148,639	..	1,190,234	516,474
Ammoniacal liquor—butts of 108 gallons	5,292	34,648	30,706	..	9,234
Sulphate of ammonia—tons	80	975	..	1,005	50

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,809,952	36,671	1,636,748	1,700,568	3920

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, oil, &c., £20,062; coke and breeze, £2788; tar, ammoniacal liquor, sulphate of ammonia, &c., £8470; sundry stores, £32,714—total, £64,034. The figures this time last year were: Coal, oil, &c., £24,291; coke and breeze, £927; tar, ammoniacal liquor, sulphate of ammonia, &c., £9212; sundry stores, £33,852—total, £68,282. A sum of £17,229 stands in the balance-sheet as employees' bonus and savings, compared with £13,508 at the end of December, 1909.

HIGH-PRESSURE GAS AT DERBY.

The report presented by the Directors of the Derby Gas Company at the annual general meeting last Friday showed that the profit on the past year's working, including bank interest, amounted to £46,403; and that a sum of £42,082 was available for distribution. The Directors recommend the payment of the standard rate of dividend on the consolidated stock at the rate of 5 per cent. per annum for the half year ending Dec. 31 last, with an additional ½ per cent. for the whole year; making 5¼ per cent., less income-tax. After payment of the dividend, and transferring to the reserve fund £579, there would be a balance of £27,596 to be carried forward.

An interesting feature of the address of the Chairman (Colonel G. Gascoyne, J.P.), in moving the adoption of the report, was the statement that in Derby they had a number of consumers who had installed the modern high-pressure incandescent lamps. Consequently, with a view to further developments, a gas-compressing plant had been put down by the Company at their Cavendish Street works, and it was proposed to lay through some of the central parts of the town a high-pressure main, in order that consumers might avail themselves of high-pressure gas if they so desired, without having to put down compressors of their own for each installation.

The report was adopted. A vote of thanks having been accorded to the Chairman, Directors, Engineer (Mr. J. Ferguson Bell), Secretary (Mr. H. Bullivant), staff, and employees, for their services during the year, the Chairman, in acknowledging it, bore testimony to the excellent work done by the staff. Mr. Bell, in reply, said he believed the Company's business never stood upon so firm a basis as it did now, nor had it stood so high in the opinion of consumers, whose interests it was their pleasure to serve. They claimed to have moved with the times, and believed the efforts the Company were putting forth to satisfy the requirements of their numerous consumers were giving general satisfaction. The latest development which had been referred to—that of high-pressure gas distribution—was one, he believed, which was destined to increase very largely indeed the use of gas for lighting purposes, as they were quite prepared to guarantee an efficiency of no less than 60 candles per cubic foot of gas. He was old enough to remember that a duty of 3 candles per cubic foot was once considered good; but the incandescent mantle with inverted burners, which he contended was the best and cheapest way of lighting, along with high-pressure distribution, gave an efficiency of twenty times that which was possible not very many years ago. From this it would be seen how enormously the cost of lighting had been reduced; and in a less degree the same applied to the use of town gas for heating purposes, in which great strides had been made during the last couple of years. Mr. Bullivant, speaking on behalf of his staff, said it was always a pleasure to know that their services gave satisfaction.

The accounts of Drakes Limited for the year 1910 show a disposable balance of £7796, out of which the Directors recommend the payment of a dividend of 6 per cent., carrying forward £1050.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual Meeting of the Newcastle-upon-Tyne and Gateshead Gas Company was held last Tuesday—under the presidency of Alderman Sir W. H. Stephenson.

The Chairman, in moving the adoption of the report and accounts, said the revenue from all sources amounted to £444,657, compared with £425,899 for the previous year; being an increase of £18,758. The expenditure totalled £328,518, compared with £317,589 for the previous year—an increase of £10,929. This left an increase of gross profit of £7829. The gross profit for the year was £116,139, and the gross amount brought forward from the previous year was £4529, making the sum for disposal £120,668. Out of this had been paid: Interest on debenture stock and other loans, £22,165; interim dividend in August, £41,293—leaving the amount to be dealt with £57,210. Out of this, the Directors recommended the payment of dividends on the ordinary and preference stocks, which accounted for £41,293, leaving a balance of £15,917. Of this, the Directors proposed to place to the reserve fund £10,000, and to carry forward £5917—last year's carry forward being £4529. The revenue comprised: Gas, £281,359; rentals of meters, stoves, fires, and fittings, £38,206; residuals, £123,175; sundries, £1917. The expenditure comprised: Coals and oil, £146,528; other manufacturing charges, £90,135; distribution of gas, £45,485; rents, rates, and taxes, £21,163; management, £19,956; sundry other charges, £5251. The quantity of gas sold during the past year was 2,998,487,000 cubic feet; being 11,445,000 cubic feet, or 0·38 per cent., more than in the previous year. It was satisfactory to find that there had been an increased consumption—though a small increase—during the past year. Considering that the confident predictions expressed a year ago were that improved trade on Tyneside would be the characteristic of the year 1910, he was sorry they were not realized. He believed, however, that they would have been realized had not the industries of the district been disturbed to such a serious extent by the regrettable disputes with respect to labour. Then, further, the exceedingly mild, bright, and open weather of December had also the effect of decreasing the consumption during that month. Residuals had realized the substantial increase of £13,095; the gain being made up as follows: On coke, £5245; tar, £3374; and sulphate of ammonia, £4476. The increase in the amount realized for coke had been obtained notwithstanding that about 1800 tons less were produced, in consequence of a larger proportion of oil gas, from which, of course, there was no yield of coke. Prices had been well maintained for the quantity exported, the demand for which continued to be good. Better prices had also been obtained for tar during the year, mainly owing to the greatly increased demand for pitch, which appeared to have been very much benefited by the increased requirements for road-making purposes, and to the demand for creosote for timber-preserving in America. Sulphate of ammonia prices were well maintained during the year. Coals cost £6053 less than the previous year, and included £1150 the extra cost of purchasing coals during the period of the miners' strike in the early months of last year. The cost of distribution had gone up, and would probably continue to do so in consequence of the largely increased number of consumers, necessitating more meters, stoves, and consumers' fittings to be maintained in first-class condition, and also owing to the very much improved service given to consumers. The Directors regretted that at present they did not consider it prudent to announce a reduction in the price of gas. The experiments with apparatus for mechanically lighting the street-lamps were now completed; and it had been found that lamps could be lighted with a remarkable degree of regularity by apparatus attached to the lamp. These were of two types—one actuated by the raising of the pressure in the mains, and the other by clockwork, without any interference with the gas. The Newcastle Corporation had decided to extend the pressure method of lighting by the installation of a further 1000 appliances. The prospects of the Company in the near future were encouraging.

Sir Walter Plummer seconded the adoption of the report, which was agreed to.

Thereafter a dividend was declared, for the half year to Dec. 31, at the rate of 4 per cent. per annum on the preference stock, and of £4 7s. 6d. per annum on the ordinary stock; and at an extraordinary meeting the Directors were authorized to issue £60,000 of new ordinary stock.

BOURNEMOUTH GAS AND WATER COMPANY.

Good Results—A Record of Price Reductions.

The Ordinary General Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. G. Crispe Whiteley in the chair.

The Secretary (Mr. H. A. Plumb, F.C.A.) read the notice calling the meeting; and the Directors' report and statement of accounts were taken as read.

The Chairman, in moving their adoption, said the half year with which they had to deal had been comparatively uneventful—the mildness of the season having been, to a certain extent, detrimental to the business. On the other hand, in spite of the mildness of the season, he was glad to say the increases had been of the usual satisfactory nature. This was perhaps most simply shown by the fact that, although last year the price of gas was reduced by 2d. per 1000 cubic feet, they had practically, by the increase in consumption during the succeeding year, made up for it entirely, and had got to where they were before. He had to congratulate the proprietors on the passing of the Standard Burner Bill, about which he had spoken on two or three previous occasions, and which became law on the 1st of January this year. The opposition to the Bill and the war waged were of the strongest character even up to the very last moment—the Liverpool people being specially irate. Why, he could never quite gather. But in spite of it all, the promoting Companies ultimately got the Bill through Parliament; and seeing the amount of money and time that were expended upon it,

he thought they were to be congratulated that it was not all wasted, as it was feared at one time it might be. The Directors were hoping now that being able to bring to bear modern testing methods would enable them to take full advantage of the new processes and improved forms of manufacture, and thereby effect economies which would be a benefit not only to the Company, but to the consumers. He said also "to the consumers" because the Company had always made a strong point of giving advantages to the consumers as well as to the proprietors. He should like to point to how they had carried out, not their promises, but their declarations in this regard. He need not remind proprietors of the continuous satisfactory character of the accounts, and of the regular payment of good dividends; but with respect to the consumers, he would take the last twelve years to show how they had considered them. Twelve years ago the price of gas in Bournemouth was 3s. 6d. per 1000 cubic feet; now it was 2s. 6d. They had therefore in the twelve years taken off just 1s.—an average of 1d. a year. The reduction at Poole was even more significant than the reduction in Bournemouth, for during the nine years that they had had the Poole works and district, the price of gas had been reduced from 4s. 4d. to 2s. 10d.; so that they had actually knocked off in the nine years 18d.—almost double the average rate at which they had reduced the price of gas in Bournemouth. This had meant thousands upon thousands of pounds spared for the consumers. While the Company had been looking after themselves, as in duty they were bound to do, the Directors had felt all along that the interests of the two—proprietors and consumers—should be maintained if they were to carry on the business satisfactorily. The Bournemouth price was now 2s. 6d.—a round sum which he thought would have to remain for the present. They had lately done so well in the matter of reductions, that he thought they must now have a rest; and he did not for the moment prognostigate any further reduction. It was said that "comparisons were invidious and odious;" but, if he might compare their price with other seaside resorts on the South Coast, there was only one (he would not mention names) that could at all approach the Bournemouth Company; and in that case the price was the same. All the others were considerably more. Of course, he knew local circumstances might make changes. That their own Company had the advantage of water as well as gas would, he knew, be the answer given by some of the other companies. At the same time, the Company were supplying the cheapest gas in the South of England for seaside resorts; and upon this they might congratulate themselves. With regard to the accounts, there were only two items to which he felt bound to draw attention. The first was in connection with the reserve fund account. It would be noted that the Directors were writing-down the investments to the market price on Dec. 31; and they had for this purpose written off £853. He need not say this was in the direction of sound finance, because there was no use in having these stocks standing at a value which they did not at present represent. The Board therefore thought this a wise and proper thing to do. But, in order that the accounts should not lose by it, they had on the other side placed £1000 to the reserve this half year; so that the reserve fund account would not lose anything by it. Seeing that by the dividend on the investments they were now automatically placing upwards of £1200 a year to the reserve, they thought they might fairly leave their reserve fund alone, and gradually accumulate a sum which would be, or rather might be, useful in the future. There was one other item; and it was the one unfortunate matter with which he had to deal. To have to refer to unpleasant subjects was very unusual at their meetings. There was an item in the profit and loss account alluding to the defalcation of the sum of £1326. He believed this was the first time, and he certainly hoped it would be the last, on which such an entry would appear in their accounts. No good purpose would be answered by going into details with regard to the unhappy and miserable circumstances that had brought this about. The proprietors, however, were entitled to know what the Directors could say from their point of view with regard to it. The Board naturally asked how this could have come about—whether all proper precautions were taken to prevent these occurrences. As the proprietors knew, their accounts were kept by one of the ablest and most experienced firms in London, and were audited by two as careful Auditors as any company could desire to have. As far as he could gather, the reply that was given by the authorities on this subject was that with an official in high position and in complete trust no accounts, and no system of checks, however complete they might be, would prevent his going wrong if he deliberately intended to do so. This case had extremely sad circumstances connected with it; and he could only say that, following up the advice which they had received, the Board had added to the checks. They were concentrating their offices, and placing certain of the administration even more directly under the eye and charge of their General Manager. They were, in short, doing everything they possibly could to obviate anything of this sort in the future. He believed that, speaking generally, while in a large staff in smaller ways these things would happen from time to time, the great bulk of the members might be said to be as loyal and honest as any company could wish a staff to be. With regard to the future, the outlook was of the brightest kind. It was true they had to fight to maintain all they had got, and they had to fight still harder to secure new business. But this seemed to agree with them. They had succeeded in the past, and they hoped to go on to still better things in the future. He could assure the proprietors that the increase during the beginning of the current half year was even more satisfactory than in the immediate past. Their contracts with regard to coal and oil would be well below last year's figures. Under these circumstances, he thought they might congratulate themselves, and go forward rejoicing in the continuance of the work they had to do.

Mr. Corbet Woodall seconded the motion, which was unanimously carried.

Moved by the Chairman, and seconded by Mr. R. Hesketh Jones, dividends were declared at the rate of 15 per cent. on the original shares, 7 per cent. on the "B" ordinary shares, and 6 per cent. on the preference shares, all less income-tax.

Proposed by Mr. Corbet Woodall, and seconded by Mr. J. C. Benwell, the retiring Directors (the Chairman and Mr. William Cash) were cordially re-elected.

The Chairman responded on behalf of himself and Mr. Cash

Mr. F. H. Pilley moved the re-appointment of the retiring Auditor, Mr. Benwell.

Mr. R. H. Glen, in seconding, thanked the Chairman for the frank way in which he had met the unpleasant item of defalcations in the balance-sheet. He, as an Auditor, knew that these things would occur; and it was by no means every Board of Directors who could have dealt with it, and put it in all its nakedness in the balance-sheet, as the Directors had done. The proprietors thanked them for their confidence.

The motion was unanimously carried.

Mr. Benwell said he desired to sincerely thank the proprietors for the honour they had done him in re-electing him as one of the Auditors. The audit had always been a thorough one; and he could confirm what had been said, without going any further into a most unfortunate affair. He might, however, add that no amount of auditing could have traced things that were not entered in the books.

Mr. A. W. Oke proposed a vote of thanks to the Chairman and Directors. In the course of his remarks, he said that, as a shareholder in some Hampshire gas companies, he took an interest in the subject of the price of gas; and the Chairman had made a little slip. But he did not think it would be so for any length of time. Southsea was a seaside resort; and it was supplied by the Portsea Island Gas Company with gas at 2s. 4d. per 1000 cubic feet. He did not think it would be long before the Bournemouth consumers would be enjoying the same privilege.

Mr. Fisher seconded the motion, which was heartily agreed to.

Mr. Corbet Woodall, at the request of the Chairman, responded. Having cordially thanked the proprietors, he remarked that the Board were glad indeed to have been able to present such a good balance-sheet. To have had in five years since they went to Poole an increase of more than 50 per cent. in the amount of profit earned, was a great testimony to the wisdom of the move, and to the efficiency of the management (he was speaking in a comprehensive manner, and not referring merely to the Directors). He should like to propose that the best thanks of the proprietors be given to the Secretary, the General Manager, the officers, and the staff of the undertaking, who (with this one sad exception) had, they knew, done their duty well and very successfully.

Mr. R. Hesketh Jones seconded the motion, and the Chairman endorsed all that had been said in praise of the officers and staff, down to the humblest worker.

The motion was cordially passed.

The Secretary having made acknowledgment,

Mr. H. W. Woodall (the Engineer and General Manager) thanked those who had spoken for the pleasant words they had used, and the proprietors for endorsing them. He highly appreciated the Chairman's remark that the Company had as loyal and honest a staff as anyone could desire. Through the unfortunate event to which reference had been made, the words were this year appreciated more strongly than usual. Working at Bournemouth under the Directors, he could attest to the fact that the Company had as honest and loyal a staff, who were deeply interested in the well-being of the Company, as any body of shareholders or Directors could wish for.

SCARBOROUGH GAS COMPANY.

Reduction to the Prepayment Consumers.

Though there was a slight falling-off in the sale of gas in Scarborough last year, chiefly owing to a further revision of the scale in connection with the public lighting of the borough, by which the Corporation effected a large saving in their gas consumption, the Directors were pleased to be able to report, at the annual meeting of the Gas Company on the 11th inst., that there had been a satisfactory increase in the number of consumers during the year, as well as a growing demand for gas appliances for cooking, heating, and other purposes. The accounts presented showed a sum of £9042 available for distribution; and the Directors recommended the payment of the usual dividends at the rate of 5 per cent. per annum (less income-tax), which would leave a balance of £2454 to be carried forward.

In moving the adoption of the report, the Chairman (Mr. W. S. Rowntree, J.P.) referred to the great loss the Company had sustained by the death of his predecessor, Mr. Benjamin Fowler, who had taken so much interest in the affairs of the Company. Turning to the work of the year, he said it was satisfactory to note that the number of consumers continued to increase; 142 being added, which brought up to 10,869 the total number on the 31st of December last. The balance of capital account stood at £5672; the expenditure during the year working out at £824 per million cubic feet of gas sold, or 16s. 4d. per 1000 cubic feet, against £932 and 18s. 8d. respectively for the year 1902. The total income was £51,243, and the expenditure £37,612; leaving the gross profit £13,631. The total of the profit and loss account was £17,848; and after meeting all charges for interest and dividends, and writing-down the investments to the extent of £344, there was a surplus of £2454 to carry forward. In view of the two reductions in the price of gas, each of 2d. per 1000 cubic feet, granted to ordinary consumers since 1908, when the last reduction was made to prepayment consumers, the Directors had decided to give their penny-in-the-slot customers in Scarborough 30 cubic feet of gas for 1d.—a reduction of (say) 4d. per 1000 cubic feet. The original price charged to this class of consumers was 3s. 8d.; therefore at the reduced rate of 2s. 9d. the price has been decreased by no less than 11d., as against a reduction of 8d. to the ordinary consumers. The prepayment consumers in Newby and Scalby would have 27 cubic feet for 1d.—a reduction of (say) 3d. per 1000 cubic feet. These reductions would take effect after the current quarter. The average consumption of gas by the ordinary consumers (exclusive of those using prepayment meters) for the past year was 39,235 cubic feet, compared with 38,280 cubic feet in 1902; showing a slight increase of 955 cubic feet during the past nine years. But against this must be placed an increase of no less than 7 per cent. in the number of consumers renting cooking-stoves—*i.e.*, from 33 per cent. in 1902 to 40 per cent. last year. During the period under review, gas-fires also to the

number of 1400 had been sold by the Company alone, to say nothing of the very large number of smaller appliances for both heating and cooking. It therefore followed that consumers, though their needs were greater, found that proportionately less gas than formerly was necessary to efficiently satisfy all their requirements. Turning to the financial side of the question, the Chairman said the average net value received per consumer last year was £4 7s. 3d., against £5 7s. 5d. in 1902, or £1 os. 2d. less than nine years ago. Though the average consumption increased by 955 cubic feet (less than 3 per cent.), the average consumer's account was now lower by no less than 20 per cent.

The report was adopted, and the dividends recommended were declared. The thanks of the meeting having been accorded to the Chairman and Directors, the former, in acknowledging it, said that though the Directors did what they could, and devoted attention to the affairs of the concern, the matter rested largely with the Manager; and the Company had never had a better one than Mr. Allan. One of his main qualifications was his pleasantness; and he had special aptitude for making things comfortable for the staff, so that everything worked smoothly. The Chairman proposed a vote of thanks to the Manager and Secretary, the officials, and the staff. The vote was unanimously accorded, and acknowledged by Mr. Allan.

ALDERSHOT GAS, WATER, AND LIGHTING COMPANY.

Good Progress in Face of Competition—The Publicity Committee and Its Work.

The Chairman of the Aldershot Gas, Water, and District Lighting Company (Mr. W. T. Robertson, J.P.), when moving the adoption of the Directors' report at the half-yearly meeting on the 10th inst., found himself in the satisfactory position of being able to inform the shareholders that, notwithstanding the competition the Company have to meet as the result of the Local Authority embarking upon the business of electricity supply, the sales of gas in the borough, exclusive of public lighting, had increased 3·6 per cent. This, he thought, was one of the most gratifying features of the half-year's trade. It not only indicated that the Company were holding their own against electricity, but that Aldershot was still expanding and growing. Having offered some observations on various items in the revenue account, the Chairman pointed out that the balance had increased from £8322, *plus* £1566 carried to the special purposes fund—in all, £9888—to £8500 *plus*, £1846 to the special purposes fund, a total of £10,346, or an increase of £458. Turning to the profit and loss account, he said that after paying first charges and dividends the undivided balance carried forward was £7708. In the special purposes fund there was a credit balance of £3683; and the reserve fund, all of which was invested in gilt-edged securities, stood at £4269 to the credit of the Company. The report was adopted, and dividends for the half year at the rates of £6 1s., £4 11s., and £5 per cent. per annum on the three classes of stock (less income-tax) were declared. A hearty vote of thanks was accorded to the Chairman, Directors, and staff; and, in acknowledging it, the Chairman said they all knew and realized that they had a very capable General Manager (Mr. R. W. Edwards) with whom he worked hand in hand; and he could assure them that they all very much appreciated the services of his personal friend Mr. Edwards and his staff, to whom they wished to tender their own very sincere thanks.

Mr. Edwards, in response, said there was no doubt that the gas industry was at present on the crest of the wave; and he trusted it might long stay there. But it would never do for those engaged in it to pause contentedly, and think they were safe. They had a competitor who was young and pushful. They must therefore not be on the defensive but on the attacking side. The gas industry had just launched a scheme called the "Publicity Committee;" and the support of all gas undertakings, municipal and company, was invited. The contribution was, comparatively speaking, but modest—based on 2s. 6d. per million cubic feet of gas sold. The idea was to carry on, under a properly constituted and efficient Committee controlled by the Institution of Gas Engineers, of which he had the honour to be a member, a plan of campaign all over the country for the purpose of properly demonstrating to the public the true value, as well as the real applications, of gas, not only for lighting, but for cooking, heating, and motive power. He hoped the Company would join in the project. If they did, they would not depend upon it, but carry on just as earnestly as ever their plan of pushing business locally; yet undoubtedly, with this superior force, their hands would be strengthened.

SALISBURY GAS COMPANY.

The Effect of the New Purifying Plant.

The Chairman (Mr. George Fullford), at the shareholders meeting, when moving the adoption of the accounts for the six months ended Dec. 31, mentioned that the revenue from sales of coke and sulphate of ammonia showed some improvement. With regard to the increased sale of the latter products, he said he might remark that their Manager was not only an engineer, but also a chemist; and the advantage of this combination was very evident. Mr. Humphrys had not been satisfied with the yield of sulphate of ammonia during the last year or two; and, by analytical methods, he had discovered that during the time of the heaviest make the existing apparatus was not equal to the removal of the whole of the ammonia, and consequently a considerable quantity was lost. He had advised the Directors to increase the purifying plant by the erection of a Kirkham, Hulett, and Chandler "Standard" washer [see *ante*, p. 370]. This apparatus was completed and put to work in October last; and the Directors were gratified to find that there was already a very respectable increase in the quantity of sulphate available for sale. With regard to other parts of the plant, the new mains had all been completed. The number of new service supplies connected up was gratifying; and there was a continuous and growing demand for automatic meters. The maintenance system, whereby burners and lamps, either for inside or outside use, were kept in good order and repair by the Company's staff of expert workmen, continued to give every satisfaction. The Company had supplied a considerable number of the new gas-steam radiators, and they were both effective and economical. The whole of the works and plant had been maintained in good order; and the Company had been well served by the Manager, the heads of the various departments, and the workmen generally.

At the close of the ordinary meeting, the Directors were authorized to raise additional capital by the issue of debenture stock to the amount of £2500.

ELECTRIC V. GAS HEATING.

Possibly some of our readers are aware that correspondence on this subject has been going on in "The Times." The Engineering Supplement to that paper last Wednesday contained two letters which are specially interesting. The first letter, bearing the signature of "Volta," was as follows.

Your correspondents leave me unconvinced on the question as to whether there is a balance on the right side of the account when electricity is supplied at 1d. or less per unit for fuel purposes. It is no answer simply to say that it is being done in many places; that tells us nothing of the financial result. And when supply engineers talk about making good 80 kilowatts out of 120 kilowatts lost temporarily through the greater efficiency of the metal filament lamp, one is entitled to ask again: Will ¾d. per unit pay dividend as well as all other charges on the 80-kilowatt plant, bearing in mind that in the British climate electric radiators are only used spasmodically during four or five months of the year, and not at all during the remainder?

The fact, in my opinion, is that in the case of the undertakings that are supplying a heating load at ¾d. or 1d. per unit, the lighting consumer is helping to pay for it; but the heating load has not reached such a figure as to make the effect obvious on the balance-sheet. If, however, a really heavy fuel load were obtained at the price, I am certain that the supply engineers would find themselves landed with a terrible white elephant; and though, from personal experience, I do not believe there is the least chance of such a thing happening (because of the relative costs, both initial and annual, of gas and electricity for fuel), I am anxious that the industry should not embark upon expensive campaigns of advertising and heavy commitments in capital until it has been proved that there is profit and not loss in the business at the price.

There is, I fancy, too much disposition on the part of the supply engineer to "go for" the heating business simply because he sees his rivals in the gas-supply world making such a good thing out of it—"to give the other chap a shaking"—rather than because he has any clear conviction that he can earn dividends as a result. Is it not rather significant that it is the supply engineers of municipal undertakings who seem keenest on the business? They have no dividends to earn.

Mr. Seabrook has convinced himself that electricity at 1d. per unit can compete as fuel with gas at 2s. 6d. per 1000 cubic feet. I can only say that my experiments do not confirm him in his view. He has to take 100 per cent. efficiency for electricity, and only 20 per cent. for gas, to get anywhere near equal running cost, allowing nothing for greater repair cost for electrical apparatus or greater first cost; and he is simply living in an imaginary paradise if he thinks that in actual practice the comparison will be so favourable as this to him. Has he ever made a scientific test of a modern gas-fire (with flue) with an electric radiator, the former of which I find gives a 50 per cent. heating efficiency? If not, I advise him to do so before he spends much more money down the fuel street.

It seems to me that he also assumes that he can ensure that cooking will only be done when it would suit his load. But as electric cooking apparatus has the best chance of adoption in big West end houses, where evening dinner is the principal meal of the day, how is he going to deal with the load on the top of his peak, if he succeeds in getting a load worth talking about?

My point is: Will this fuel at ¾d. per unit pay? If not, do not let us spend a heap of money on trying to get it simply because the gas man can make money out of his fuel sales. I am ready and willing—but still waiting—to be convinced.

The other letter was by Mr. F. W. Goodenough, the Controller of the Sales Department of the Gaslight and Coke Company. It was as follows.

It is not, perhaps, for one interested in gas supply to intervene in a domestic discussion among electricians as to whether or not they can afford to supply current for heating and cooking at 1d. or ¾d. per unit; but I should just like to say a word to any reader who may be inclined to attach importance to Mr. Seabrook's assertion that "there is no doubt whatever" (the preface to many a highly contentious assertion) "that a properly designed complete [electrical] cooker"—such as he admits does not yet exist—"can compete on cost with gas where electricity is 1d. per unit and gas is 2s. 6d. per 1000 feet." I do not ask Mr. Seabrook for his proofs, because he has not even got the cooker to produce. I only wish to say that every test made under ordinary working conditions that I have been able to make between electrical apparatus for cooking and heating and gas apparatus designed for the same purpose has proved quite conclusively that gas at 2s. 6d. per 1000 cubic feet can beat with ease electricity at 1d. per unit, without taking any credit for cheaper cost of apparatus and much lower cost of upkeep. When our friends the electricians have discovered how to get more than a pint out of a pint pot—more thermal units out of a given quantity of energy than its complete combustion will produce—they may be able to make a commercial business out of selling current for heat at fractions of a penny per unit. In the meantime, shareholders in gas companies may be advised not to be alarmed.

In reply to a question, it was stated in the Wolverhampton Town Council that it was hoped to submit, at an early date, a scheme for the improvement of the lighting of the whole borough.

GAS V. ELECTRICITY AT MANCHESTER.

Electricity Committee's Reply to Alderman Gibson's Criticisms.

The second joint conference between members of the Electricity and Gas Committees of the Manchester City Council was held last Friday afternoon—the Lord Mayor presiding. The Chairman of the Electricity Committee (Mr. Howarth) submitted a reply to the attack made at the last conference [see *ante*, p. 324] by Alderman Gibson, the Chairman of the Gas Committee, on the working and administration of the Electricity Department of the Corporation. The Electricity Committee had met earlier in the day to consider the report.

It will be remembered that at the previous meeting of the two Committees, Alderman Gibson showed that the capital account of the Electricity Department had grown from £1,173,000 in 1903 to £2,678,000 in 1910; and that in 1900, with a capital of £641,000, the department made a profit of £9765, whereas last year, with a capital of £2,678,000, they made a profit of £12,000, or less than one-half per cent. on the capital. Briefly put, Alderman Gibson's further charges were:—That electric supplies were being furnished under cost; that insufficient provision was being made for depreciation; and that the return on capital, as handed to the city fund in aid of rates, was altogether insufficient, particularly compared with that paid over by the Gas Department.

Mr. Howarth said that while the Electricity Committee strongly resented the assumed right of the Gas Committee to criticize their policy, they welcomed the opportunity afforded of making a plain statement of their case. He then dealt with the early history of the undertaking; showing how the system had been extended to its present enormous dimensions as the outcome, directly or indirectly, of the Council's policy of the municipalization of the trams. The latter had entailed, and would continue to entail for the next few years, the burden of the heavy capital outlay, for which the present Committee accepted no responsibility, and but for which they might be in a position to furnish supplies of current at lower rates. As to the question of depreciation, the Electricity Committee were of opinion that no one could dogmatize without a proper study and expert knowledge of the usual "lives" of the different assets constituting the equipment of an electrical undertaking. Tables were submitted to show that the rate of depreciation allowed in Manchester is ample, and that the Electricity Department is in a stronger financial position to-day, judged from the standpoint of its renewals fund, than at any time since its inception.

Mr. Howarth spent considerable time in refuting the charges that the Electricity Committee sold current below cost. Alderman Gibson made a strong point in his statement that 34 firms had been taken from the Gas Department owing to unfair "cut-throat" prices having been offered them by the Electricity Department. The Electricity Committee, in their reply, pointed out that eight of the cases cited were not customers of theirs at all. Thirteen left the Gas Department years ago and installed their own steam or electrical plant before coming on to the Electricity Department's mains; and the remaining thirteen had been electricity consumers for at least eleven years, at which date the prices would be more properly prohibitive.

As to the return on their capital outlay, the Electricity Committee contended that, taking into consideration the expenditure they had incurred on the tramways, and the low prices charged under agreement for traction current, as well as the loss which at present they are unavoidably incurring on the out-districts, to expect a greater contribution to the rates than 1 per cent. on their outstanding mortgage debt would seriously cripple the undertaking. The Committee also pointed out the serious effect on their revenue for the last two years that the new metallic filament lamp has had; and they freely admitted that, had they foreseen the effect of the change, they would not have recommended the Council to reduce the lighting prices at December, 1907. The leeway was, however, being rapidly made up, and the Committee were confident that soon the lost ground would be more than recovered.

An Unsound Policy.

Mr. John C. B. Percy, of the Ratepayers' Association, writing on the subject of Municipal Trading, says: "In my judgment, Alderman Gibson was perfectly justified in compelling the attention of the City Council to what I believe to be the unsound policy of the Electricity Committee. There is no doubt whatever in my mind that, if a safe depreciation was allowed on the electricity plant, instead of showing less than ½ per cent. return to the ratepayers, there would be a somewhat serious loss. And is there really anybody who is bold enough to contend that the ratepayers should saddle the liability of £2,678,630 for the sole benefit of 9000 consumers? Alderman Gibson, from a financial point of view, has certainly done his duty by the gas undertaking. More than half the loans has been paid off; and within recent years the policy of shorter loans has been adopted, with the result that the annual payments to the sinking fund are heavy—thus quickly reducing our liability. At the same time, he has given the ratepayers a return of nearly 2 per cent. on the capital employed. But I do wish Alderman Gibson and his Committee, and the whole of the Council, would turn their serious attention to the excessive cost of administration. If the administration of the Corporation's affairs were conducted as economically as an ordinary house, lower charges might be made, and rates might be reduced without any loss in efficiency. I have never yet been able to solve the problem that, while Manchester puts gas into the mains at 2d. per 1000 cubic feet less than Birmingham, the selling price in our city should be 3d. per 1000 cubic feet higher than that charged in the Midlands Capital. The difference, with the discount which Birmingham allows for prompt payment, amounts to £125,000 per annum. Manchester should, at any rate, be able to sell gas as low as Birmingham; and in that case the price could be reduced 3d. per 1000 cubic feet, over £60,000 per annum saved to the consumers, and the present 2 per cent. return upon capital still be paid."

Subject to audit, a dividend at the rate of 10 per cent. per annum, with a bonus of 5s. per share, will be declared by the British Gaslight Company, Limited, for the six months ended Dec. 31 last, at the forthcoming ordinary general meeting.

SALFORD GAS CHARGES.

A Concession to Slot-Meter Consumers.

At the Meeting of the Salford Town Council last Wednesday, Mr. Purcell moved that consumers of gas by prepayment meters should have remitted to them "an amount equal to the difference between 27 and 30 cubic feet of gas per penny charged during the period over which the meter-rents were charged, and since resolved by the Council to be remitted." In answer to a question, Mr. Purcell frankly acknowledged that he did not know how his suggestion could be carried out; but this, he declared, was not his concern. His contention was that if the Council could find the means to commit an injustice, they could also find the means of rectifying it.

The resolution having been seconded by Mr. Greenlees, the Mayor (Alderman Phillips), as Chairman of the Gas Committee, said he was prepared to admit that, on grounds of justice, it was perhaps impossible to deny that a remittance was equitably due; but he desired to point out the great difficulty that would arise in the distribution of such trifling sums, if Mr. Purcell's resolution was carried. He suggested that the case might be met to some extent by precedence being given to users of prepayment meters at the earliest possible moment in any reduction that might be made in the price of gas. On behalf of the Gas Committee, he offered to give an undertaking that, when a reduction was decided upon, prepayment meter consumers should have the advantage of it a week before the ordinary consumers.

This offer was accepted by Mr. Purcell; and the resolution having been amended so as to include the suggestion of the Mayor, it was agreed to unanimously.

The Demand for a Town's Meeting.

The second of the ratepayers' meetings to protest against the gas charges was held last Wednesday night in the Robert Hall Street School, and was addressed by five members of the Town Council. A resolution protesting against the present gas charges, both for prepayment and ordinary meters, was carried unanimously; and it was further resolved that a petition be signed and presented to the Mayor of the borough urging the immediate necessity of holding a town's meeting to consider the whole question.

Councillor Delves, one of the speakers, declared that the decision to reimpose the gas-meter rent charges was brought about by an ambition on the part of certain members of the Council to effect a reduction in the rates. The rates were reduced by 1d.; and the burden that resulted from this reduction was placed upon one section of the community—the poorer class among the gas consumers. He was pleased to say that, in consequence of the protests made, the charges had been abolished, and the money paid was to be refunded to consumers. But those who were protesting against the charges would not be satisfied until a similar return had been made in the case of slot-meter users. The masses of the people were up in indignation against the illegal procedure that had been adopted to make them pay the rates of the richer classes.

Councillor Willoughby explained how the Gas Committee came to adopt last year the resolutions as to gas charges. He said that, in consequence of the increased sum the Gas Department were called upon to find in relief of rates, the only alternative to the reimposition of the meter-rent charges was to increase the price of gas, or have an increase in the rates. The money had to be found from somewhere, if the Gas Committee were to be relieved of their obligation to produce the required £15,000 in aid of rates.

Councillor Purcell also addressed the meeting. He said that the Salford gas undertaking, having regard to its size and the number of population served, was about the most successful in the kingdom; and it was one of the most cheaply managed undertakings. It had also paid more than the bulk of the gas undertakings in relief of the rates. There were only two other undertakings in the country with a similar population that had paid as much towards the rates as Salford had; and there were very few concerns that obtained as much for their bye-products as Salford did. Taking these facts into consideration, he contended that the price of gas ought to be as low as in any other town in England—Widnes and Sheffield, for example. During 25 years, the Salford gas undertaking had paid in relief of rates £527,000; but they did not find rents had gone down in consequence. The people who got the relief were the richer class of the community.

THE ELECTRIC LIGHTING QUESTION AT HASTINGS.

Gas Company Reply to a Newspaper Attack.

Readers of the "JOURNAL" are aware that the Hastings and St. Leonards Gas Company have deemed it to be their duty, as large ratepayers, to protest against some of the proceedings of the Corporation in regard to their electricity undertaking; and at a recent Local Government Board inquiry, as already recorded in the "JOURNAL" [*ante*, p. 390], they elicited information which the Board's Inspector will doubtless find useful. By their action on this and other occasions they have incurred the wrath of the "Hastings and St. Leonards Observer," which has always supported the Electricity Department; and in their issue for the 28th ult. some comments were made which the Company regard as "unfair and inaccurate." These have been replied to by the Company's Solicitors (Messrs. Young, Coles, and Langdon) in a letter which appeared on the 11th inst.

Among the principal statements to which the Company object are these: "That the Gas Company are attempting to rule the ratepayers in the matter of light . . . . and to dictate to them as to what light they shall use. That whenever the Town Council apply to the Local Government Board for power to extend the work of the Electricity Department, the Gas Company endeavour by persistent opposition to strangle the effort. The aim of the Corporation in asking for power to borrow the money required for the works is to increase the consumption of the light . . . . but it is bitterly opposed by the Gas Company. Why? Because the Company want to get all they can for themselves." The Company's Solicitors submit that there is no

justification for these allegations. They say the object of the Company in opposing the applications for loans has been to prevent the Corporation from carrying on their business on lines which are not commercially sound, and which are unremunerative, and therefore prejudicial to the ratepayers, of which the Company are one of the largest. In 1907 a loan (which was not opposed by the Gas Company) was granted, and out of it a sum of £1500 was expended in laying electric light mains in the Clive Vale district for four consumers; and since that time only five new consumers have taken electric light in this district. The Company considered this was unsound and uncommercial; and it certainly has not proved to be remunerative. Prior to that the Company had not taken steps to oppose any of the applications for loans made by the Corporation. When the Corporation decided in 1908 to apply for a loan of £1683 for the conversion of gas-lamps for lighting by electricity, the Company opposed the application on the ground that it would be unremunerative, and it was refused. But, in spite of the refusal, £1100 had since been expended out of the rates for the conversion of these lamps. In consequence of the way in which the loan of 1907 was expended, the Company opposed in 1909 an application for a loan of £4000 for mains and house services. Some of this was granted with certain stipulations which the Company say have been disregarded; and this fact and the refusal of the loan in 1908 they consider fully justified them in appearing at the recent inquiry, and furnish a complete answer to the unfair comments of the newspaper.

In conclusion, the Company's Solicitors say: "It was clearly never intended by Parliament that the electric light undertaking should continually be carried on at an annual charge on the ratepayers, as is evidenced by the terms of the Provisional Order; and a great many of the ratepayers consider that it is quite time the undertaking was made self-supporting instead of supporting itself on the rates to the tune of close upon £10,000 in the last three years. But this happy condition cannot be brought about while current is being sold at non-paying prices, and expenditure is being made on unremunerative extensions."

The issue of the "Observer" in which the letter appeared contained a long editorial article dealing with it.

Water-Works Extension near Wigton.—The Aspatria, Silloth, and District Joint Water Board have decided upon the installation of mechanical filters and the construction of covered service reservoirs, with a capacity of 750,000 gallons, upon a site six miles from Wigton. It is probable that the Board will be required to supply a large area in the Wigton and Holme Cultram districts. The estimated cost of the works is about £20,000.

Water-Works for the Neath District.—On the invitation of Mr. A. T. Williams, J.P., the Chairman of the Neath Rural District Council, and the members of the Water Committee, a visit was paid a few days ago to the Ystradfellte Water-Works, which the District Council are carrying out in their area. Mr. Hill (the Consulting Engineer) stated that the Council had a gathering-ground of 20,000 acres, and since their last visit to the works a great deal had been accomplished. When completed the dam would be one of the highest in the country, and the depth of the water would be 104 feet. He hoped to have the works ready in twelve months.

GAS LIGHTING FOR THE EDMONTON TOWN HALL.

At the Meeting of the Edmonton District Council last Tuesday, the Town Hall Committee submitted a report on the system of lighting to be employed in the Town Hall. They said they had inspected the effect of the arrangements made by the Tottenham and Edmonton Gas Company and the North Metropolitan Electric Power Supply Company for lighting the hall. The consumption in both cases was tested, and it was found that, with regard to the lighting by gas, the 13 pendants, consisting of Sugg's inverted lamps controlled by the Telephos system [see *ante*, p. 451] consumed gas at the rate of 54 cubic feet per hour, which worked out, on the terms of the Gas Company, at 1·4d. per hour. The Company's Engineer (Mr. A. E. Broadberry) undertook to maintain the lamps, including attention to the lighters and renewal of batteries and glasswork, for the sum of 2s. per lamp per annum. With reference to the electric lighting, the 13 metallic filament Osram lamps consumed at the rate of 1·285 units of electricity per hour, which would cost 4½d. per hour for lighting. The representative of the Electric Power Supply Company pointed out that the lamps would remain in the same condition for six months; and, in respect to the cost of maintenance, he referred to the fact that the Council had paid the Company only 16s. 6d. for the maintenance of 14 or 15 lamps at the corner of Angel Road during the two years and nine months the lamps had been in use. The Committee recommended the Council to adopt gas lighting for the Town Hall; and this was agreed to.

FAILURE OF ELECTRICITY AT BRADFORD.

A breakdown at the electricity station of the Bradford Corporation on the afternoon of the 11th inst. led to the sudden cessation of the electricity supply all over the town. The stoppage occurred at 5.15 p.m., and was total as far as lighting and private power consumers were concerned for twenty minutes; while for a further ten minutes the current was below the normal voltage, and gave only a dim light. Fortunately the breakdown came at a time when there was still a good light; and the inconvenience was consequently reduced to a minimum. A few shopkeepers, the situation of whose premises makes it necessary for them to light up early, had to fall back on gas or send out for candles. Being Saturday afternoon, very few power users were affected. The chief sufferers were the managers of evening papers, whose machinery was brought to a standstill just at the time the football issues were being printed. At the Theatre Royal the lights went out as the end of the last act of the pantomime had been reached. Fortunately, the theatre is equipped with an alternative gas installation, which was at once brought into use, and the audience was able to disperse in good order. The cause of the breakdown was the fusing of a wire controlling a generator that was just being switched into circuit. The load at the time being light, there were only two small machines running; and as they were not capable of supplying the short-circuit current, they broke down too. This affected the motors running the circulators and steam-pumps; and the stoppage being complete, it was a matter of some little difficulty to restart.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 506.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 14	5	Alliance & Dublin Ord.	81—84	..	5 19 1
374,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
200,000	5	Oct. 28	7	Bombay, Ltd.	6½—7	..	5 0 0
40,000	5	,,	7	Do. New, £4 paid	5—5½	..	5 1 10
50,000	10	Aug. 31	15	Bourne- 10 p.c.	28½—29½	..	5 1 8
311,810	10	,,	7	mouth Gas B 7 p.c.	16¼—16⅝	..	4 3 7
75,000	10	,,	6	and Water Pref. 6 p.c.	14¾—15¼	..	3 18 8
380,000	Stk.	Aug. 12	12½	Brentford Consolidated	257—260	..	4 16 2
330,000	,,	,,	9⅓	Do. New	200—203	..	4 13 7
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	,,	Dec. 15	4	Do. 4 p.c. Deb.	98—10[0]	..	4 0 0
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	220—223	..	4 18 8
246,320	,,	,,	8	Do. A Ord. Stk.	159—162	..	4 18 9
460,000	20	Sept. 29	10⅔	British	44—45	..	4 14 5
109,000	Stk.	Feb. 10	6	Bromley, A 5 p.c.	116—118*	..	5 1 8
165,700	,,	,,	4½	Do. B 3½ p.c.	87—89*	..	5 1 2
82,278	,,	,,	5½	Do. C 5 p.c.	106—108*	..	5 1 10
55,000	,,	Dec. 30	3½	Do. 3½ p.c. Deb.	84—86	..	4 1 5
250,000	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	95—97	..	4 2 6
100,000	10	—	—	Cape Town & Dis., Ltd.	3¼—4¼	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6—6½	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	—	..	—
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	88—90	..	5 0 0
157,150	Stk.	Aug. 12	5	Chester 5 p.c. Ord.	109½—111½	..	4 9 8
1,513,280	Stk.	,,	5/9/4†	Commercial 4 p.c. Stk.	114—117	+1	4 13 5
560,000	,,	,,	5¼†	Do. 5½ p.c. do.	109—111	+1	4 16 1
475,000	,,	Dec. 15	3	Do. 3 p.c. Deb. Stk.	77—79	..	3 15 11
800,000	Stk.	,,	4	Continental Union, Ltd.	95—97	+½	4 2 6
200,000	,,	,,	7	Do. 7 p.c. Pref.	136—138	+1	5 1 5
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	,,	—	4	Do. Deb. Stk.	104—105	..	3 16 2
148,295	,,	Oct. 14	5	East Hull 5 p.c. Ord.	103—105	..	4 15 3
486,000	10	Jan. 27	12	European, Ltd.	26—27	..	4 8 11
354,060	10	,,	12	Do. £7 10s. paid.	19½—20½	..	4 7 10
16,179,445	Stk.	Aug. 12	4⅜	Gas- 4 p.c. Ord.	107—108	..	4 6 4
2,600,000	,,	,,	3½	light 3½ p.c. max.	87—89	..	3 18 8
4,062,235	,,	,,	4	and 4 p.c. Con. Pref.	103—105	..	3 16 2
4,531,705	,,	Dec. 15	3	Coke 3 p.c. Con. Deb.	78—80	..	3 15 0
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	94—96	..	5 4 2
82,500	,,	,,	6½	Do. do. 5 p.c.	114—116	..	5 12 1
70,000	10	Oct. 14	11	Hongkong & China, Ltd.	17¼—17⅝	..	6 4 0
131,000	Stk.	Sept. 15	7⅜	Ilford A and C	147—150	..	4 18 4
65,780	,,	,,	5½	Do. B	116—118	..	4 19 6
65,500	,,	Dec. 30	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
4,940,000	Stk.	Nov. 11	9	Imperial Continental	186½—188½	+1½	4 15 6
1,235,000	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	92—94*	..	3 14 6
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	122—124	..	4 16 9
561,000	Stk.	,,	10	Liverpool United A.	220—222	..	4 10 1
718,100	,,	,,	7	Do. B.	164—165	..	4 4 10
306,083	,,	Dec. 30	4	Do. Deb. Stk.	102—104	..	3 16 11
75,000	5	Dec. 15	6	Malta & Mediterranean	4⅜—5	..	6 0 0
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	102—104	..	4 16 2
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	102—104	..	4 6 7
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12½—13	..	5 7 8
1,775,892	Stk.	July 28	4	Newc'tle&G'tesh'd Con.	101½—102½	..	4 5 4
529,705	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	89—90	..	3 17 9
55,940	10	Aug. 31	7	North Middlesex 7 p.c.	13½—14½	..	4 16 7
300,000	Stk.	Nov. 30	8	Oriental, Ltd.	139—141	..	5 13 6
60,000	5	Sept. 15	8	Ottoman, Ltd.	6½—7	..	5 14 4
31,800	53	Aug. 31	13	Portsea Island A	133—135	..	5 1 8
60,000	50	,,	13	Do. B	126—128	..	5 1 7
100,000	50	,,	12	Do. C	119—121	..	4 19 2
114,800	50	,,	10	Do. D and E.	103—105	..	4 15 3
398,490	5	Oct. 28	7	Primitiva Ord.	7⅝—7⅞	+⅛	4 8 11
796,980	5	Dec. 30	5	Do. 5 p.c. Pref.	5¾—5⅞	..	4 10 11
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	95—97	..	4 2 6
312,650	Stk.	Dec. 30	4	River Plate 4 p.c. Deb.	95—97	..	4 2 6
250,000	10	Sept. 29	9	San Paulo, Ltd.	15¼—16	..	5 12 6
115,000	10	,,	6	Do. 6 p.c. Pref.	11⅜—12¼	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Aug. 31	10	Sheffield A	232—234	..	4 5 6
209,984	,,	,,	10	Do. B	231—233	..	4 5 10
523,500	,,	,,	10	Do. C	231—233	..	4 5 10
70,000	10	Oct. 14	6	South African	10½—11	..	5 9 1
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	118½—120½*	..	4 10 8
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	78¾—80¾	..	3 14 6
209,820	Stk.	Aug. 31	8	South Shields Con. Stk.	156—158	..	5 1 3
605,000	Stk.	Aug. 12	5⅜	S'th Suburb'n Ord. 5 p.c.	120—122	..	4 12 9
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	122—124	..	4 0 8
502,310	Stk.	Nov. 11	5	Southampton Ord.	111—113	..	4 8 6
120,000	Stk.	Feb. 10	7	Tottenham A 5 p.c.	141—143*	..	4 17 11
483,940	,,	,,	5½	and B 3½ p.c.	114—116*	..	4 14 10
149,470	,,	Dec. 15	4	Edmonton 4 p.c. Deb.	98—100	..	4 0 0
182,380	10	Dec. 30	8	Tuscan, Ltd.	9—9½	..	8 8 6
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
236,476	Stk.	Aug. 31	5	Tynemouth, 5 p.c. max.	114—115	..	4 6 11
255,636	Stk.	Aug. 31	6¾	Wands- B 3½ p.c.	144—146	..	4 12 6
85,766	,,	Dec. 30	3	worth 3 p.c. Deb. Stk.	73—75	..	4 0 0

Prices marked * are "Ex. div." † Next dividend will be at this rate.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The "Dunfermline Press" of to-day is responsible for the information contained in the following paragraph: "A meeting of the Commercial Section of the North British Association of Gas Managers was held in the Council Chamber, Corporation Buildings, Dunfermline, yesterday. Mr. A. Mackay, Montrose, presided. The chief business discussed was a proposal by the Institution of Gas Engineers to advertise the use of gas, on the same lines as those adopted by electricity corporations. The meeting agreed to support the recommendation, by contributing to a fund, expected to amount to £15,000, which will be devoted to the publication of information setting forth the advantages of gas, and giving useful hints to consumers and those engaged in its manufacture. In the course of a discussion regarding the valuing of gas concerns, the opinion was freely expressed that at present the valuation was determined upon a somewhat unfair basis as compared with other trading concerns. The meeting decided that the time had arrived for legislation in order to ensure more equity on the subject; and it was agreed to accord hearty support to any movement in that direction. After the meeting, the gas managers were entertained at tea by the Dunfermline Corporation in the Royal Hotel."

In the Dunfermline Town Council on Monday, the Lighting Committee recommended that the lighting of High Street be by high-pressure gas-lamps. In a report upon the subject by Mr. A. Waddell, the Inspector of Lighting, it was recommended that 16 lamps of 1000-candle power each be erected, and that four lamps of 1500-candle power each, which are at present temporarily placed at the Corporation Buildings, should be installed at street corners—the lamps at the Corporation Buildings being replaced by others of 1000-candle power. The initial cost of the change was estimated at £100, and the annual charge at £76. The recommendation was agreed to. It was reported that the Dunfermline District Committee of the Fife County Council had granted permission to the Town Council to lay a gas-pipe from Dunfermline to Culross.

The Kirkcaldy Town Council on Monday made arrangements for the borrowing of £100,000 to meet the price of the Gas Company's undertaking. Mr. Lockhart asked Bailie Wright what was the position of the gas arbitration, and what was the cause of the delay which was taking place. The delay was a serious matter for the town. It would involve considerable extra expenditure; and they were getting very near May, when they would want to borrow money and have their arrangements completed. Bailie Wright said he had done all he could to forward the arbitration. After the finish of the first week's proceedings in Edinburgh, the Arbiters fixed the following week for continuing the inquiry in London; but Counsel on both sides made out that they could not go. Last week he went to Edinburgh, to see the Clerk to the Reference; and he urged upon him the desirability of pushing on the Arbiters as far as he could. He had had a communication from their own Agent, to the effect that he did not yet know when the arbitration was to be resumed. Later, their Agent wrote to him that he had learned that the difficulty was with the Arbiters, or probably one of them; but that he gathered that they would hear something definite a fortnight hence. This was the latest information he had; but he thought the Council should instruct the Town Clerk, through the Clerk to the Reference, to urge upon the Arbiters the necessity for getting the matter over as soon as possible. Bailie Wright's suggestion was adopted.*

In the Dalkeith Town Council on Monday, the minute of a meeting of the Lighting Committee, dated Jan. 23, showed that the Chairman—Bailie Alison—had referred to the unsatisfactory reply which had been received from Mr. J. P. Gray, the Secretary of the Gas Company, and that the Burgh Surveyor had been testing the pressure of the gas, and had found that it had been very much increased of late. The Burgh Surveyor submitted the readings which he had obtained when he made his tests, and stated that not only was gas being passed through the burners from which no benefit was derived, but that the pressure had damaged the mantles of the inverted burners. The Chairman considered that the Council ought to know from the Gas Company whether the increased pressure was to be continued during the remainder of the lighting season, so that the burners might be regulated to it, or whether the increase was of a temporary nature where no alteration would be necessary. He suggested that a communication should be made to the Gas Company on the subject, and an early reply requested. This was agreed to. The Town Clerk reported to the Council that a letter was sent to the Company on the 3rd inst., and that, replying to it on the 11th inst., the Secretary wrote stating that the figures in the Burgh Surveyor's report appeared to be quite correct, though no previous readings were given, as they corresponded with those taken by the Gas Company. These pressures, it was added, had been in existence since the beginning of the lighting season of 1908. Bailie Alison supplemented the information with the statement that there had been an increase of 5-10ths in the pressure, which had been put on in 1908, in order to supply some customers at a lower level. They had asked the Company that in future any changes in the pressure or quality of the gas should be intimated to the Council.

Bailie Smith, the Convener of the Gas Committee of the Arbroath Town Council, on Monday evening tendered his resignation as a member of the Council. Mr. G. R. Wallace was appointed Convener of the Gas Committee.

On Saturday last, an augmentation to the water supply of Newburgh, in Fifeshire, was formally inaugurated. The new works consist of a reservoir, which has been constructed, at a cost of over £1000, to plans by Mr. W. Lockhart, of Kirkcaldy. The inauguration ceremony consisted of the turning on of the water by ex-Provost Edwards, who was in office when the scheme was adopted.

* We learnt yesterday that the proceedings [see *ante*, pp. 107, 174, 238] will be resumed at the Surveyors' Institution, Westminster, next Saturday morning at ten o'clock, and be continued the following week.—ED. J.G.L.

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CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 554.]

LIVERPOOL, *Feb.* 18.

Sulphate of Ammonia.

During the past week middlemen have displayed great activity in competing for all available supplies, the purchasing having been not only for February but also for March shipment at prompt values. Consumers generally have not shown so much eagerness; but some of those in the United Kingdom have bought for delivery over the next two or three months. At the close, the tone is very firm, and the quotations are £13 17s. 6d. per ton f.o.b. Hull; £14 per ton f.o.b. Liverpool; and £14 2s. 6d. per ton f.o.b. Leith. Transactions in the forward position have been more numerous, and the figures reported as having been paid are £13 15s. per ton for April-June, and £13 5s. per ton for July-December, f.o.b. at the best ports. Manufacturers are now asking more money for both periods; but buyers hesitate to follow the advance further.

Nitrate of Soda.

The market for this article is quiet but steady at 9s. 9d. and 10s. per cwt. for ordinary and refined qualities respectively on spot.

LONDON, *Feb.* 20.

Tar Products.

The markets for tar products have continued very firm during the last week. In pitch, there is a fair amount of inquiry; but buyers do not seem inclined to purchase at the prices quoted. Benzols are very firm. There has been a little inquiry for solvent naphtha during the past week, which, however, has not had any effect on the price. Heavy naphtha is steady. In crude carbolic, the increased values are well maintained, and sales have been made at different periods at the figures now quoted. Creosote is steady, but the value remains unaltered.

The average values during the week were: Tar, 18s. 3d. to 22s. 3d., *ex* works. Pitch, London, 36s. 6d. to 37s. 6d.; east coast, 36s. 6d. to 37s. 6d.; west coast, Manchester, 36s. 6d to 37s., Liverpool, 37s. to 37s. 6d., Clyde, 37s. to 38s. Benzol, 90 per cent., casks included, London and North, 9½d. to 10d.; 50-90 per cent., casks included, London and North, 9d. to 9¼d. Toluol, casks included, London, 9¾d.; North, 9¼d. Crude naphtha, in bulk, London, 4d. to 4½d.; North, 3½d. to 3¾d.; solvent naphtha, casks included, London, 11½d. to 1s.; North, 10½d. to 11d.; heavy naphtha, casks included, London, 11⅜d. to 1s. 0½d.; North, 10¾d. to 11d. Creosote, in bulk, London, 2¼d. to 2⅜d.; North, 1⅞d. to 2d. Heavy oils, in bulk, 2⅜d. to 2⅝d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 7d.; west coast, 1s. 6½d. Naphthalene, £4 10s. to £8 10s.; salts, 40s. to 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

There has been a considerable amount of buying during the past week, and the value is again a little higher. Actual Beckton seems to be all sold for near delivery; and for April-June they ask £13 10s. Outside London makes are £13 5s.; Hull prompt, £13 15s. to £13 17s. 6d.; and for forward, higher prices have been paid. In Liverpool, £13 15s. to £13 17s. 6d. is quoted; Leith, £13 17s. 6d.; and Middlesbrough, £13 15s. to £13 17s. 6d. For forward delivery, the majority of makers are asking a premium.

COAL TRADE REPORTS.

Northern Coal Trade.

The demand for coal is still full, but the high winds have hindered the arrival of steamers, and thus impeded the shipments. In the steam coal trade, prices have shown a little ease. Best Northumbrian steams are about 9s. 9d. to 9s. 10½d. per ton f.o.b., second-class steams 8s. 6d. to 8s. 9d., and steam smalls from 4s. 9d. to 6s. 3d. In the gas coal trade, the demand continues heavy, though it is below that at the beginning of the year. Durham gas coals vary from 8s. 9d. to 9s. 4½d. per ton f.o.b., according to quality, for the usual classes; and up to 10s. 6d. for "Wear specials." Several small contracts for gas coal for Sweden and Denmark are reported at prices that are expected to leave from 10s. 4d. to 10s. 7d. per ton f.o.b., according to the rate of freight allowed. Some cargoes for the Mediterranean have also been sold at about 8s. 10½d. per ton f.o.b.; and some 10,000 tons for Savona, at about 16s. 4½d. per ton delivered. In coke, the market is steady. Gas coke is in fair demand for export at 14s. to 14s. 3d. per ton f.o.b. in the Tyne or Wear.

Scotch Coal Trade.

The market has been more active. There has been a better demand for shipment purposes over the season, which is looked upon as a good feature. Small stuffs are in request. The prices now quoted are: Ell, 9s. 6d. to 9s. 9d. per ton f.o.b. Glasgow; splint, 9s. 9d. to 10s.; and steam, 9s. 3d. to 9s. 6d. The shipments for the week amounted to 306,478 tons—an increase of 49,193 tons upon the previous week, but a decrease of 3217 tons upon the corresponding week last year. For the year to date, the total shipments have been 1,618,707 tons—a decrease upon the corresponding period of 17,761 tons.

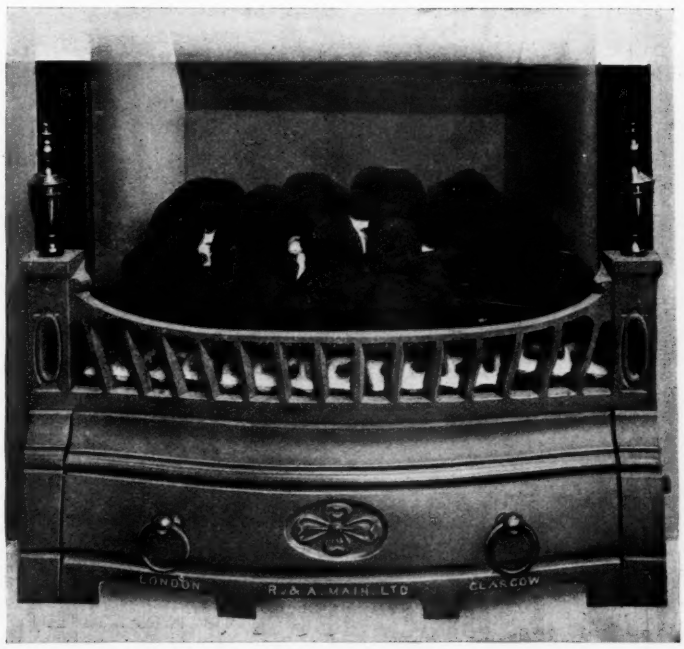
The Blackpool Corporation, having had various machines inspected, have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for one of their combined charging and discharging machines, to work two of their horizontal retort-benches and settings. The firm have also been favoured with an order for the whole of the coal-handling plant.

A WIDENING CIRCLE.

The circle of friends of the "ST. NICHOLAS" FIRE is an ever widening one. Appended is a note of commendation from Mr. J. D. Ashworth, of the Portsea Island Gas Company:—

"I am perfectly satisfied with the 'ST. NICHOLAS' Gas Fire which you supplied to my Company. This being the first we purchased, I had the same fixed in an ordinary Fire Grate and I am more than pleased with the results and its appearance."

The "RESULTS AND APPEARANCE" make friends for the "St. Nicholas" Fire wherever it is fixed.



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Charge against a Maidstone Official.

At the Maidstone Police Court on Friday, Henry Hickmott was charged on remand (*ante*, p. 386) with falsifying certain accounts of the Maidstone Gas Company, in whose service he was engaged as Chief Collector. Among the witnesses called was Mr. E. W. Drew, the Company's professional Accountant. After a lengthy hearing the Bench committed the defendant for trial at the forthcoming Assizes; bail being allowed in the same sureties as before.

Abstraction of Water from the Thames.

In the King's Bench Division of the High Court of Justice last Friday, before Mr. Justice Phillimore, the action brought by the Conservators of the River Thames against the Metropolitan Water Board in respect of the abstraction of water from the river was mentioned. Mr. C. B. Marriott, who appeared for the plaintiffs (Mr. A. B. Shaw representing the defendants) said his Lordship might remember the case being before him rather more than a year ago [see "JOURNAL" for Nov. 30, 1909, p. 625]; and after it had been partly heard it stood over for certain amendments to be made. The hearing was to have been resumed later; but, owing to the intervention of the Board of Trade and the Local Government Board, the parties had been able to come to terms, with the result that his Lordship would not be troubled further. The terms agreed were that the action should be discontinued, without prejudice to the plaintiffs' right to bring another if the settlement went off, which was dependent upon proposed legislation. Both parties agreed to pay their own costs.

Improved Gas Lighting in Westminster.—The Works Committee of the Westminster City Council have reported that the City Engineer (Mr. James W. Bradley, M.Inst.C.E.) informed them that seven high-pressure gas-lamps in Whitehall and Parliament Street had been left out of lighting since the installation of the new gas-lamps in these streets, which are provided for under the contract with the Gaslight and Coke Company, with the view of ascertaining if they could be dispensed with. He recommended, after observation of the new lighting, that the lamps in question should be removed and re-erected in positions shown on a plan submitted by him, at a cost of £5 per lamp. The annual cost per lamp for lighting and maintenance is £13 11s. 3d. The recommendation is to be carried out. The Baths and Washhouses Committee have considered a communication from the City Engineer that for some time past he has had experimental gas-lamps fitted up at the Marshall Street Laundry, and finds that the two-light fittings put up are most successful. He suggested that inverted gas-burners should be substituted for the existing electric light and flat-flame burners, the cost of which he estimated at £35. He assured the Committee that this sum would soon be saved, and a better light afforded. Instructions have been given to have these alterations carried out.

Gas Fatality at Swansea.

At an inquest at Swansea, on the body of an old-age pensioner named Roberts, who was found dead in bed on Monday of last week, it was stated that since the previous Wednesday deceased had complained of gas in his room, though no supply was laid on to the house. In response to a post-card sent off on the Friday, a man from the gas-works visited the adjoining house (where gas was also complained of) on Saturday, and was alleged to have said that nothing could be done till the Monday, as all the men had gone home. He told them to keep the windows open; but he did not go to the house where deceased lived, because there was no gas there. Mr. Fred Andrews, Outdoor Superintendent to the Gas Company, said the post-card referred to was not received till Saturday, and a service fitter was immediately sent, and the discovery made of a broken connection on the service-pipe about a foot from the channel. This service was laid in September, 1906, and was perfectly good. He attributed the breakage to a steam-roller passing over the road. William Bevan, gas-meter fitter, said when he went to the house on the Saturday afternoon he could only smell the gas faintly, and did not think it sufficiently serious to report to the time-keeper, as all the fitters and labourers had left work. Dr. Hunter attributed death to asphyxia from coal gas. The Coroner said the only question for the Jury was whether anybody had been guilty of culpable negligence. It seemed to him there was an error of judgment in not reporting the leak at once, so as to secure immediate attention. The Jury returned a verdict of "Death from suffocation by coal gas;" expressing the wish that the Gas Company would attend to complaints at once, and that the Company would bear the funeral expenses. They attached no blame to anyone.

Ipswich Water Supply.—In the course of an interesting lecture given by Mr. C. W. S. Oldham, the Engineer and Manager of the Ipswich Water-Works, before the local Engineering Society last Thursday evening, on "The Water Supply of Ipswich and the County of Suffolk," he gave the following particulars in regard to the supply of the borough. He said that previously to 1855 the town was provided with water from various sources under different ownerships—the principal being the property of the Corporation. In that year, the Corporation sold their share to four private gentlemen for £21,500. In 1857, an Act of Parliament was obtained by them to enable them to form a Company; and in 1892 the Corporation decided to buy the undertaking. Since then the quantity of water consumed had increased from 354 to 578 million gallons per annum, and the population by more than 15,000. The sources of supply now in use were two wells and boreholes into the upper chalk, together with supplies from the gravel and clay. In view of the fact that the present supply was hardly sufficient to meet the maximum demand, and also allow for the possible emergency of having to abandon the use of any of the present sources, the Corporation were seeking parliamentary powers to carry out works to obtain a further supply at Akenham. A discussion followed; and Mr. Oldham was accorded a hearty vote of thanks for his lecture.

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Sale of Stocks and Shares.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards sold a new issue of stock by the Great Yarmouth Water Company by order of the Directors, and some gas shares and stock under instructions from executors. The Water Company offered £1000 of 4 per cent. perpetual debenture stock and £4000 of new ordinary stock. The former was sold at £105 per £100; and the latter (which is a 7 per cent. stock carrying 4 per cent.) at £92 to £94. A few fully-paid £10 shares in the Waltham Abbey and Cheshunt Gas Company, ranking for a standard dividend of 10 per cent., subject to the sliding-scale, but carrying 8½ per cent., fetched £17 15s. each; and some shares of similar nominal value, with a 5 per cent. standard dividend, but carrying 5½ per cent., in the Epping Gas Company, sold for £12 10s. apiece. The last lots consisted of £242 of consolidated ordinary stock of the Chigwell, Loughton, and Woodford Gas Company, ranking for a standard dividend of 5 per cent., but carrying 6 per cent.; and it fetched £152 to £152 10s. per £100. When Messrs. Richards last sold stock of this Company, before the proposed amalgamation with the Gaslight and Coke Company was announced, it realized £125 per £100; the dividend being then 5½ per cent. As will be seen from what is stated above, it has since been increased to 6 per cent.; so that buyers at £125 would get a return of £4 16s. per cent. But at the prices realized on Tuesday, the stock will yield rather less than 4 per cent. on the last dividend.

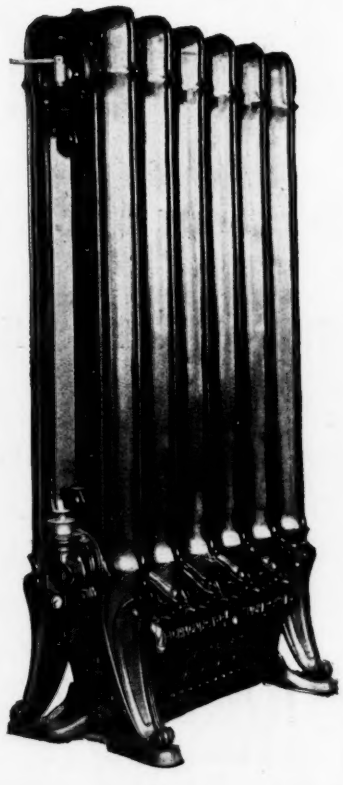
Walker and Wallsend Union Gas Company.—According to the report of this Company for the year ended the 31st of December, which was presented at the recent annual meeting, the revenue was £43,364, and the expenditure £30,011; leaving a balance of £13,353. Adding the balance of undivided profits, £5289, a sum of £18,642 was produced. Interim dividends at the rates of 4½ and 6 per cent. per annum on the 3½ and 5 per cent. ordinary stocks (less income-tax) had been paid; and final dividends at the like rates were declared at the meeting. These and other payments absorbed £11,843, and left a balance of £6799. The Directors stated that the manufacturing and commercial returns all round had proved to be very satisfactory.

Bath Gas Company.—In the report presented by the Directors of this Company at the annual general meeting last Wednesday, they stated that there was an increase in the quantity of gas sold, and a considerable improvement in the sale of residual products, last year as compared with 1909. The accounts accompanying the report showed that the revenue was £95,608 compared with £92,680, and the expenditure £73,451 against £72,779; the balance carried to the profit and loss account being £22,157, whereas this time last year it was £19,901. The amount available for distribution was £19,990. An interim dividend of 5 per cent. per annum was paid for the half year ended the 30th of June on the consolidated ordinary stock, and the Directors recommended that one at the same rate should be paid on this stock for the second half of the year, less income-tax.

Improvements at Launceston Gas-Works.—It was reported at the annual meeting of the Launceston Gas Company that one of the retort-beds had been reconstructed on the regenerative principle, and that as the result greater economy had been effected in the working. Owing to complaints by Dr. Fryer, one of the Inspectors under the Alkali Acts, the sulphate of ammonia plant had also required improvement. The Chairman (Dr. Thompson) said that, in consequence of the complaints, the foreman had got up in the night and made sulphate, hoping that the people would sleep through it and not smell it. This, however, had not been a successful experiment. Mr. Treleaven referred to the Provisional Order which the Company are promoting, and said they were asking for a maximum dividend of 8 per cent., which was the dividend they had been paying to the proprietors for many years past.

Disposal of Gas Profits at Belfast.—After hearing the views of a deputation of the Finance Committee on the subject of the allocation of surplus profits from the gas undertaking in aid of the rates, the Belfast Gas Committee adopted the following resolution: "That the Council be recommended to grant to the Finance Committee out of the profits the amount necessary for the payment of dividends and sinking fund on the capital expenditure on the City Hall; but that, owing to the burdens ahead, the Committee feel compelled to refuse any further grant this year." Subsequently, the Council met in committee, when, it is understood, the following resolution was passed: "That the Council be recommended to authorize the allocation of a sum of £10,000 out of the surplus profits of the gas undertaking in the year 1911-12 in relief of rates, and the continuation of the annual payment towards the interest and sinking fund upon the capital expenditure on the City Hall."

Record Year at Littleborough.—Mr. J. C. Hudson presided over the recent half-yearly meeting of the Littleborough Gas Company. The accounts showed that for the six months ended Dec. 31 the gas sales amounted to £4687, compared with £4387 for the corresponding period of 1909. Residuals realized £1264, against £1229. The profit on the revenue account was £1578, and the disposable balance £3194. The quantity of gas sold during the half year was 33,565,200 cubic feet, compared with 31,422,500 cubic feet in the latter half of 1909. There was a 5 per cent. increase in the gas sales for the twelve months ended December last; and the total gas produced during this period was 70¾ million cubic feet, which constitutes a record. The Chairman, in moving the adoption of the Directors' report, congratulated the shareholders on the fact that the balance-sheet revealed another satisfactory increase in gas sales, and also that the improved working results had justified the action of the Board in reconstructing the plant. Both of these factors had resulted in the lowering of the charges to the consumer. The shareholders expressed satisfaction with the report; and thanks were accorded to the Directors and officials of the Company for their services. A dividend of 10 per cent. per annum (less income-tax) for the half year was declared.



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has the combined qualities of scientific construction and interchangeability of parts. Another order for Eighty 10-loop Radiators has recently been placed. All records have been beaten this winter.

THE RICHMOND GAS STOVE & METER CO., LTD.

Gas Supply at Masterton (N.Z.).

We have received from the Manager of the Gas-Works of the Masterton (N.Z.) Corporation—Mr. James W. Blackman—the report and accounts of the Gas Department for the year ended the 31st of March, 1910. They furnish the following interesting particulars. The gross profit upon the manufacturing account was £2304, in addition to which there was a profit of £142 on gas-fittings. Interest and sinking funds (including exchange) absorbed £1569. Money was spent on capital account out of revenue for mains, meters, and services. The quantity of coal carbonized during the year was 2237¾ tons, and the make of gas was 25,139,400 cubic feet, or at the rate of 11,233 cubic feet per ton. Of the total make, 23,246,000 cubic feet were accounted for; the difference (1,893,000 cubic feet) being equal to 6·64 per cent. New offices and a show-room have been opened which have provided additional office accommodation, and have greatly facilitated the transaction of business with the Gas Department. The price of gas was reduced in May last by 5d. per 1000 cubic feet all round. As the profit on the figures for the past financial year was 9·87d. per 1000 cubic feet, the reduction brings it down to 4·87d.; and Mr. Blackman considers that with only this margin the price must not be further reduced until the consumption of gas is considerably increased. He gives a list of the charges in other towns (many of them seaports), and points out that the price in Masterton compares very favourably with them. The prices now charged are as follows: Lighting, 6s. 3d.; cooking and lighting (combined rate), 5s. 10d.; power, 5s. As the railway freight of coal to Masterton is 10·63d. per 1000 cubic feet, the foregoing prices are considered by Mr. Blackman to be the lowest in New Zealand. The question of the public lighting has been engaging his attention for some little time; and he purposes dealing with it in a supplementary report upon the automatic lighting and extinguishing of the street-lamps, and the various systems which are now at the service of gas undertakings. In a separate report, Mr. Blackman deals with the closing of the old works and the erection of new ones adjacent to the railway. These works are the outcome of instructions given to him early in 1907 to report on the probable requirements of the Gas Department for the ensuing six years. He estimated that the output of gas in 1909-10 would be 25,249,800 cubic feet, and, as stated in his report noticed above, it was actually 25,139,400 cubic feet. He recommended an expenditure of £12,000; £7000 being for plant, £3000 for extensions of mains, and the rest for new services, meters, and cookers. A loan was sanctioned for the amount named; but while the plans for the extensions were being prepared, Mr. Blackman was instructed to report as to the feasibility of erecting entirely new works. This he did early in 1908; his estimate of the additional cost being £5000; making £17,000 in all. Possession of the site selected was obtained in October, 1908, and the work proceeded as rapidly as possible. The manufacture of gas was started on May 5, 1910; and the works were formally opened by the Mayor on the 9th of June. They had entailed an expenditure up to Nov. 21, 1910 (the date of the report) of £12,137, inclusive of £2032 for main extensions; and a further outlay of £3830 was estimated for removals, new mains, and additions to the plant to bring the works up to 50 millions capacity—making a total of £15,967. In bringing his report to a conclusion, Mr. Blackman remarks that in designing the new works he endeavoured, so far as they would allow, to put in nothing but the best and most up-to-date plant procurable. The works were so designed that, should future business justify it, the necessary machinery for charging and drawing retorts and the mechanical handling of coal and coke can be installed without material alteration or interference with the present buildings. As to the wisdom of carrying out the scheme, which is now practically completed, he says there can be no doubt; for it is owing to the erection of the new works that the low rates now being charged for gas have been made possible.

Leigh-on-Sea Gas Supply.—It was reported to the Leigh-on-Sea Urban District Council that a letter had been received from the Southend Gas Company offering to supply gas in bulk for a period of seven years (the minimum quantity to be 750,000 cubic feet in each year), at 3s. per 1000 cubic feet; the fall or rise in price to be proportionate to any increase or reduction in the selling price to ordinary consumers. The Gas Committee decided to agree to the purchase of a minimum of 500,000 cubic feet per annum at 2s. 6d. per 1000 cubic feet. Mr. Meachen moved the confirmation of the Committee's action; remarking that the amended offer had not yet been before the Gas Company, but he hoped it would be accepted. Mr. Taylor observed that the Committee wanted the Company to reduce the price to them, but the Council did not want to reduce it to the consumers. The action was confirmed.

Competition between Gas and Electricity.—The following remarks by "An Engineering Correspondent" appeared among the "Electrical Notes" in the Engineering Supplement to "The Times" last Wednesday: "The somewhat unseemly quarrel between the Gas and Electricity Departments of the Manchester Corporation affords yet another illustration of what the electrical industry has to put up with. Gas has been an inveterate enemy of electricity in this country, not merely on its merits as a rival means of lighting and heating, but as a strongly intrenched vested interest. Of the earlier obstacles to the progress of electric lighting, the possession of gas departments by municipal authorities was by far the most difficult to remove. Engineers ready with their plans, manufacturers prepared to build plant and apparatus, were kept waiting or made to move at a snail's pace compared with what the situation really justified, simply because local bodies wished to protect their gas monopolies to the last possible moment. Ever since, there has been witnessed in many towns a disposition to make a spoilt child of the gas department, and to treat the electrical department as an unwelcome step son. Electric lighting and cooking have been deliberately stunted in their commercial growth in order that gas might not suffer by comparison. The policy is unfair to the industry and unfair to the public; and it is to be hoped that this Manchester protest against enterprising competition on the part of the Electrical Department will be one of the last of these unedifying incidents. It may not be many years before both these monopolies are disturbed by the coming of wireless transmission."

S&P

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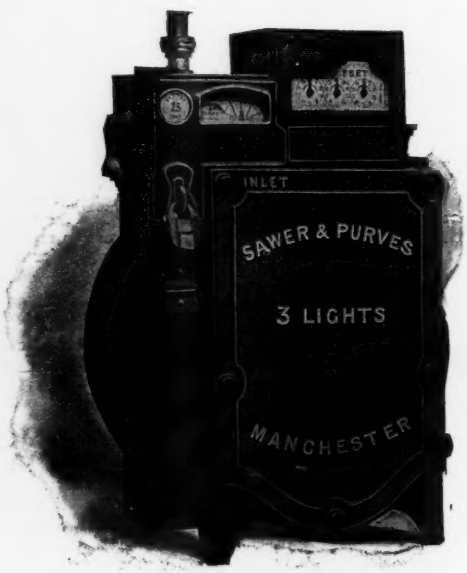

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M&N

Manchester Corporation Lamplighters' Hours and Pay.—A meeting of the lamplighters employed by the Manchester Corporation was held a few days ago with a view to their "better organization," as the conveners of the gathering put it. At present the men are allowed seven days' holiday in the year. This they contend is insufficient; and they propose agitating for an occasional Sunday off in addition. It is also claimed that the men are not at present adequately paid for the work they are called upon to perform. The wages now are 25s. per week; and it is submitted that this is lower than the scale of pay obtaining in some large centres. When the lamplighters have been organized, their claims are to be laid before the Gas Committee.

Salford Ratepayers and Gas Questions.—The annual report of the Salford Ratepayers' Association, just issued, deals at some length with gas matters. Referring to the meter-rents question, the report says: "This is only one of a number of irregularities for which the Corporation is responsible; and the more inquiries are instituted the more does it appear that we are overruled by officials whose love of authority exceeds their sense of responsibility. . . . The Parliamentary Bill recently promoted by the Gas Committee has been dropped, and this for the second time. We should like to know how much this game of bluff has cost the ratepayers. The last Parliamentary Bill was also withdrawn, after costing the borough and out-townships nearly £5000—for nothing.

Reduction in Price at Longwood.—At the annual general meeting of the Longwood Gas Company last Thursday, the Directors reported that the quantity of gas sold in the twelve months ended the 31st of December was 111,639,000 cubic feet; being an increase of 9,218,600 cubic feet, or 9·21 per cent. on sales in the preceding twelve months. The balance carried to the profit and loss account was £4699, and the amount available for distribution £4711. A dividend at the rate of 3 per cent. on the consolidated ordinary stock was recommended; making, with the interim dividend, 5½ per cent. for the year. The Directors announced a reduction of 3d. (from 2s. 9d. to 2s. 6d.) in the price of gas as from the 31st prox. The Chairman (Mr. R. Thornton, the Mayor of Brighouse), referring to the reduction in the price of gas, said there was no undertaking in Yorkshire which supplied gas so cheaply. The Engineer and Manager (Mr. J. H. Brearley) explained the co-partnership scheme initiated by the Directors on the 1st of July last, whereby each employee receives a bonus of 1 per cent. for every penny by which the price of gas is reduced below the standard of 3s. 1d. He said they commenced with 4 per cent. bonus, but with the reduction now made it would be increased to 7 per cent.

Mr. J. A. Aston, for about fourteen years Chief Clerk, and latterly Cashier, to the Tipton Urban District Council Gas Department, has been appointed to the post of Chief Clerk to the Cheltenham Gas Company, in succession to Mr. Percy Culling.

The parishioners of Pulborough (Sussex) have adopted a report presented to them in favour of obtaining a supply of water from wells. The cost is estimated at £15,000; and the mains would extend to Nutbourne, Mare Hill, Broomhurst, and Codmore Hill.

On leaving to take up an appointment under the Croydon Gas Company, Mr. W. Gledhill, foreman in the stove and fitting department of the Brighton and Hove Gas Company, was presented with a parting gift in the form of a silver cigarette case, with his initials marked thereon.

At last Wednesday's meeting of the Rochdale Gas Committee, Mr. T. B. Ball, the Gas Manager, reported that there had been sent in over 240 applications for a vacancy as senior clerk in the office. The Committee, on the recommendation of the Works Sub-Committee, decided on the appointment of Mr. Percy Ashworth, of Castleton.

We have received from Messrs. W. Canning and Co., of Birmingham, the fourth edition of their "Handbook on Electro-Plating, Polishing, Lacquering, Burnishing, and Enamelling." The work has been carefully revised and brought up to date, and deals with the latest inventions in connection with special plating methods by the new improved solutions. As the book has been written from actual workshop experience, it is submitted as one which may be read with profit by a novice as well as by an expert.

Messrs. Drakes Limited, of Halifax, have secured a large order for extensions at the Sowerby Bridge Gas-Works. The contract includes a new retort-house and coal-store, with steel roof; new retort-bench, consisting of eight through beds of eight 22 in. by 16 in. D retorts 20 feet through, on the regenerator principle, together with all iron work, stage floors, coal breaking, elevating, and conveying plant, with a battery of storage hoppers, coal-handling plant, and a combined charging and discharging machine complete, with generating plant; and a large cast-iron tank for the storage of tar, liquor, and water, and a set of annular condensers.

The Oldham Corporation have confirmed an order given to Messrs. Robert Dempster and Sons, Limited, of Elland, for two four-lift spiral-guided gasholders, one of which is of the same capacity as, and is to be placed alongside, the one recently erected by them at the Higginshaw works; and the other, of similar size, is to be erected at the central works of the Corporation in Greaves Street. Both gasholders are to replace two worn-out telescopic holders at present guided by cast-iron columns. It may be remembered that Messrs. Dempster and Sons have also in hand a spiral-guided holder of 5½ million cubic feet capacity, the concrete tank for which is now making rapid progress.

Messrs. Peckett and Sons, locomotive engineers, of Bristol, have sent us a copy of an artistic little book they have just issued containing some views of the shops at their "Atlas" works, and a few examples of the locomotives built there. The works occupy 5 acres, and have a covered area of 101,800 square feet, with a further 8 acres for extensions. They are conducted under the immediate supervision of the proprietors; and the engines are manufactured by skilled workmen in buildings especially designed and erected so as to obtain the maximum amount of light and convenience for the proper execution of the work. All the examples of locomotives shown are of useful sizes and are effectively illustrated. The frontispiece is a view of the Royal train used at the opening of the Swansea New Docks.

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TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Feb. 18. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar crude	per ton	22/6	19/6 22/6	19/6 23/-	20/- 22/-	20/- 22/6	—
Pitch	,,	37/- 37/6	37/6	37/6	38/6 39/-	37/- 37/6	37/6
Benzol, 90 %	per gallon	-/11	-/9½	-/9	-/8½ -/8¾	-/9	-/10½
Benzol, 50-90%	,,	—	-/10	-/9½	-/8½	-/9	—
Toluol, 90%	,,	-/10½	-/9½	-/10	-/10	-/9¾	-/9½
Crude naphtha, 30%	,,	—	-/3¾	-/3½	-/3¾	-/3¾ -/4	—
Light oil, 50%	,,	—	-/3½	-/3¾ -/4	-/3½	-/3¾	—
Solvent naphtha, 90-160	,,	1/-	-/10½ -/11	-/10	-/10¼	-/11	-/11
Heavy naphtha, 90-190	,,	—	-/11	-/11⅛	-/11⅛	-/11½	-/11
Creosote in bulk	,,	-/2½ -/2¾	-/2 -/2¼	-/2	-/2 -/2¼	-/2 16	-/1⅞
Heavy oils	,,	-/3½	-/2½ -/3	-/2¼	-/2¾ -/3	-/2¾ -/3	-/3
Carbolic Acid, 60's	,,	1/8	1/7½	1/7	1/7	1/7½	1/7
Naphthalene, crude drained salts	per ton	—	42/6 45/-	40/- 42/6	47/6	47/6 50/-	—
,, pressed	,,	—	60/-	63/-	60/- 62/6	67/6	—
,, whizzed	,,	—	—	—	70/- 72/6	70/-	65/-
Anthracene	per unit	-/2	-/1⅜	-/1½	-/1¼	-/1¼	—

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER (FRENCH) FOR TAR DISTILLATION. No. 5352.
SALESMEN (COAL). No. 5358.
CLERK. Leigh-on-Sea Gas Department. Applications by March 2.

Situations, &c., Wanted.

AGENT OR SECRETARY. No. 5356.
SULPHATE PLANT-REPAIRER, &c. Davis, Shepherd's Bush.

Plant, &c. (Second-Hand), For Sale.

HYDRAULIC MAIN AND TAR VALVES. Ilkeston Gas-Works.
PYROMETER, No. 5359.
STATION METER. Oldbury Gas Department.
TAR-WORKS. Box 836, care of Horncastle's.

Meetings.

BRENTFORD GAS COMPANY. St. Ermin's Hotel. Feb. 24. 2.30 o'clock.
HARROW AND STANMORE GAS COMPANY. Holborn Restaurant. March 6. Twelve o'clock.
HORLEY GAS COMPANY. Great Eastern Hotel. March 1. Three o'clock.

Stocks and Shares.

CARDIFF GASLIGHT AND COKE COMPANY, By Tender. March 14.
DARTFORD GAS COMPANY. By Auction. March 14.
HARROW AND STANMORE GAS COMPANY. By Auction. March 14.
LOWESTOFT WATER AND GAS COMPANY. By Auction. March 14.
SOUTH-WEST SUBURBAN WATER COMPANY. By Auction. Feb. 28.
SOUTHAMPTON GASLIGHT AND COKE COMPANY. By Tender. Feb. 28.
SOUTHEND WATER COMPANY. By Auction. Feb. 28.

TENDERS FOR

Coal.

FORFAR GAS DEPARTMENT. Tenders by March 10.
ROCHDALE GAS DEPARTMENT. Tenders by March 1.
SALFORD GAS DEPARTMENT. Tenders by March 9.
SHEPPY GAS COMPANY. Tenders by March 7.

Cookers.

LLANDUDNO URBAN DISTRICT COUNCIL.

Fire Clay Goods and Retort Settings, &c.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
LIMERICK GAS DEPARTMENT. Tenders by March 6.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 2.

General Stores (Fittings, Oils, Paints, Ironmongery, Iron and Steel, Lead Pipe, Shovels, Sulphuric Acid, Lime, &c.).

BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
MIDDLETON GAS DEPARTMENT. Tenders by March 1.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 2.

Meters.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 2.

Oxide of Iron.

RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 2.

Pipes, &c.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 1.
MIDDLETON GAS DEPARTMENT. Tenders by March 1.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 2.

Tar.

CARLISLE GAS DEPARTMENT. Tenders by March 1.

Tar and Liquor.

EXETER GASLIGHT COMPANY. Tenders by March 3.
HAWORTH URBAN DISTRICT COUNCIL. Tenders by Feb. 28.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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